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POTENTIAL DEVELOPMENT OPPORTUNITIES

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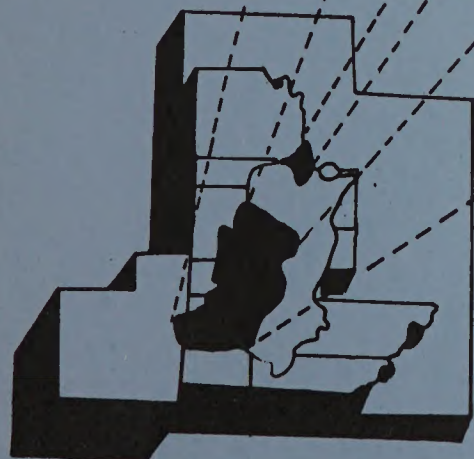
BEAVER RIVER BASIN

APPENDIX V, *P42*
(Irrigation Systems)
Supplement

JUNE 1973

UTAH

NEVADA



Prepared By
UNITED STATES
DEPARTMENT of AGRICULTURE
Economic Research Service — Forest Service
Soil Conservation Service
In cooperation with
UTAH STATE
DEPARTMENT of NATURAL RESOURCES

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APPENDIX V

POTENTIAL DEVELOPMENT OPPORTUNITIES

IRRIGATION SYSTEMS SUPPLEMENT

BEAVER RIVER BASIN

UTAH - NEVADA

Prepared by
United States Department of Agriculture
Economic Research Service - Forest Service - Soil Conservation Service
In cooperation with
Utah State Department of Natural Resources

June 1973

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The following publications have been prepared under the Beaver River Basin study:

Summary Report

Appendix I Natural Resource Inventory
 Soils Supplement

Appendix II Present and Projected Resource Use and Management
 Water Related Land Use Supplement
 Water Budget Analysis Supplement

Appendix III Resource Related Problems

Appendix IV Economic Base and Needs

Appendix V Potential Development Opportunities
 Irrigation Systems Supplement

A P P E N D I X V

POTENTIAL DEVELOPMENT OPPORTUNITIES

IRRIGATION SYSTEMS SUPPLEMENT

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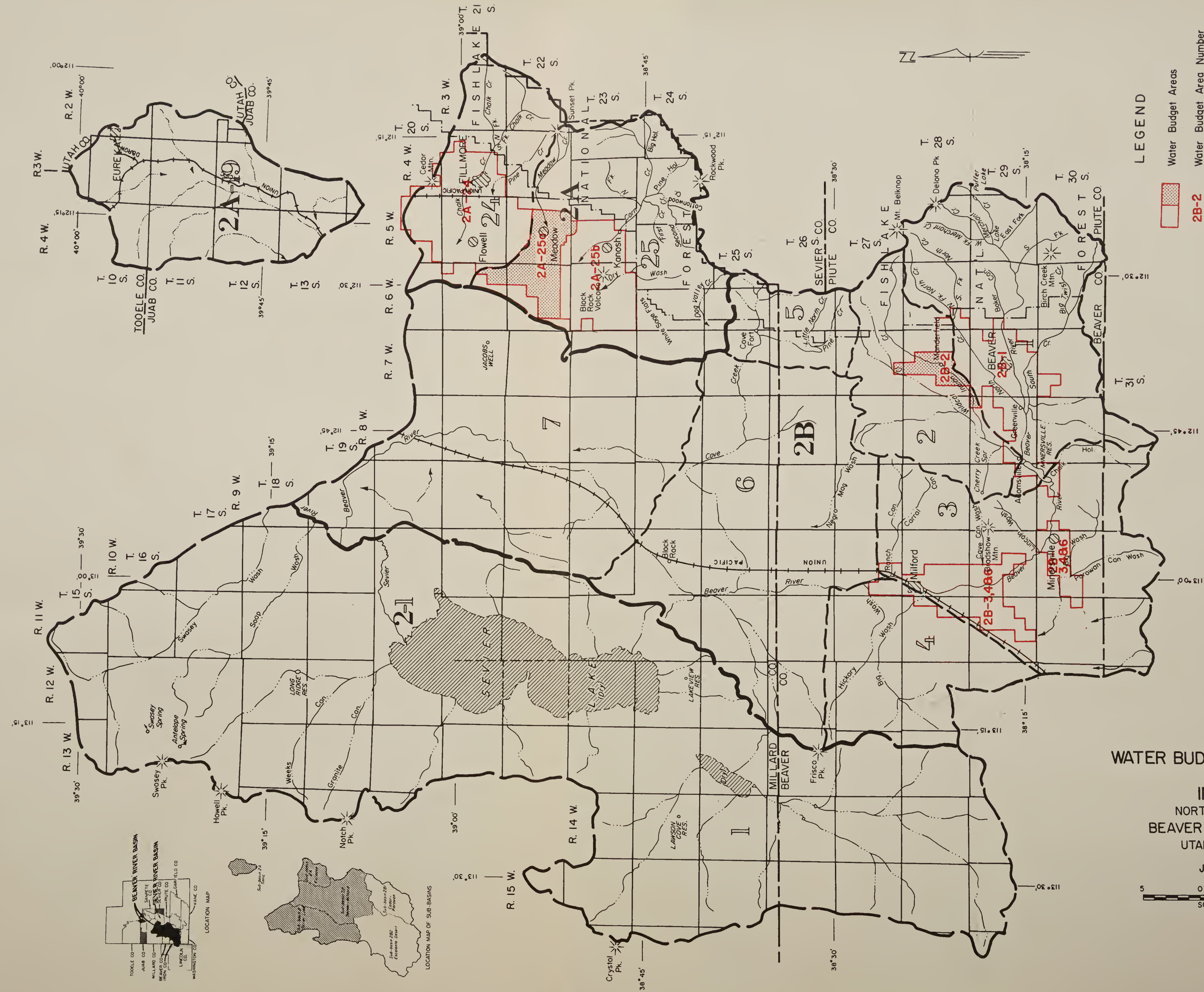
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I N T R O D U C T I O N

This supplement presents the results of an irrigation company reconnaissance level inventory conducted as part of the Beaver River Basin investigation during 1969 and 1970. Information on irrigation company distribution and conveyance systems was obtained from interviews with local company officials, Soil Conservation Service files, and field inventories. Data collected and discussed here apply only to irrigation company systems and areas of responsibility, and do not include individual or group on-farm ditches. Data collected during the study included information on company organization, source and amount of water supply, area served, water rights, and irrigation efficiencies. Water rights were not studied in detail. No attempt was made to determine either the legality of the water diversions shown, or the accuracy of water right data obtained during the inventory. The condition of the company irrigation systems with respect to management, seepage losses, phreatophyte growth, structure condition, and replacement needs was inventoried. Problems concerning water shortages, sedimentation, floodwater damages, and interruption of service were studied. Potential solutions such as reorganization and consolidation, lining, new structures, storage and regulating reservoirs, floodways, and debris basins were identified.

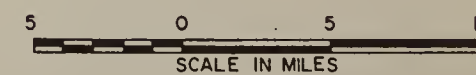
Maps were prepared at a scale of one inch equals one mile for each water budget area showing the existing canals and laterals, and the areas served by each irrigation company. Map delineations for "areas served" may include small tracts of non-irrigated land, but in general show irrigation company delivery obligations. The maps are intended to show only an overview of irrigation company systems and relationships. Water budget areas are outlined on the Water Budget Boundary and Index map following page 1.

The "Irrigation Systems Supplement" is presented as part of Appendix V "Potential Development Opportunities", which is one of five appendixes prepared as part of the Beaver River Basin Study. Additional publications are listed in the front of this supplement. Some of the information from this supplement concerning present conditions and use are summarized and presented in Appendix II "Present and Projected Resource Use and Management." Other information from this supplement concerning problems are summarized and presented in Appendix III "Resource Related Problems."



WATER BUDGET BOUNDARY
AND
INDEX
NORTH PORTION
BEAVER RIVER BASIN
UTAH- NEVADA

June 1971



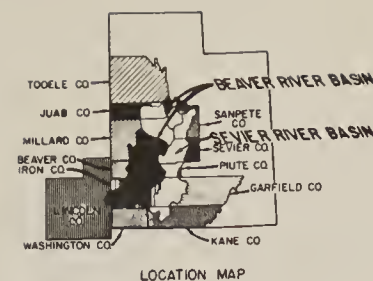
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Water Budget Areas

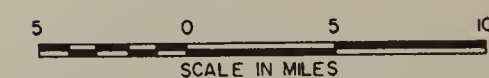
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Water Budget Area Number



WATER BUDGET BOUNDARY AND INDEX SOUTH PORTION BEAVER RIVER BASIN UTAH-NEVADA

June 1971



S U M M A R Y

There are approximately 50 irrigation companies serving about 63,700 acres (55 percent) of the irrigated land in the Basin. These companies operate and maintain 420 miles of canals and laterals with individual capacities up to 100 cfs. The overall Basin conveyance efficiency is 69 percent. By 1965, about 97 miles (23 percent) of the company canals were lined. The condition of irrigation company distribution and conveyance systems vary from good to poor. Basin-wide, the average condition is "poor" (Table 1).

Most irrigation companies are incorporated as non-profit organizations and issue capital stock representing the owners right to water from the company system. Stockholders are assessed to cover the costs of administering, constructing, operating, and maintaining facilities.

Generally, a water master is assigned the responsibility of delivering water to the users according to their stockholdings. Water is delivered mainly on a rotation basis, although some companies are able to deliver water on demand or call. Engineering, legal, and other technical services are obtained as the need arises. In many instances, delivery systems and other services are duplicated. Occasionally a water user will receive water from more than one canal for the same land.

Riparian vegetation grows on nearly all canal banks. Most canals have sections constructed on gravelly soils where seepage losses are high. Some canals traverse steep hillsides. Most irrigation companies divert water from streams but a few receive supplemental water from wells. Most large canals have grades of 1 to 5 feet per 1,000 feet, but some canals and laterals follow section lines and field boundaries where grades of 15 feet per 1,000 feet are common. Flooding, erosion, sediment deposition, burrowing animals, and slides cause failures and high maintenance costs in many systems. Surface water supplies vary widely, both seasonally and from year to year. Most surface water runoff occurs when the demand is low, and as a result, late season supplies are inadequate.

There are many potential opportunities for irrigation company distribution and conveyance system improvements. It is estimated that 180 miles of canals and laterals could be lined within the next 10 to 15 years. This would increase the overall Basin conveyance efficiencies to approximately 87 percent and canal conditions to "good" (Table 2).

TABLE 1.--Irrigation company distribution and conveyance systems status, 1965, Beaver River Basin

Water budget area and subbasin	Area served	Canal ^a length	Conveyance efficiency	Canal lining		Canal ^b condition
				Open	Pipe	
	Acres	Miles	Percent	Miles	Miles	
2A-24	9,000	51	65	6	0	Fair
2A-25a	4,500	16	90	12	1	Good
2A-25b	5,300	24	66	9	0	Poor
2A Fillmore	18,800	91	69	27	1	Fair
2B-1	12,500	141	64	4	0	Poor
2B-2	1,500	7	65	3	0	Fair
2B-3, 4, 6	6,000	29	73	6	0	Fair
2B-5	400	8	66	0	0	Poor
2B Beaver-Milford	20,400	185	67	13	0	Poor
2B1-1c, 2, 4 Cedar	12,500	82	66	25	2	Poor
2B1-1a, 3a Summit	1,000	4	74	2	0	Fair
2B1-1b, 3b Parowan	5,200	31	65	4	9	Poor
2B1 Cedar-Parowan	18,700	117	66	31	11	Poor
2B2-1	3,300	11	80	3	2	Fair
2B2-2	2,500	16	70	8	1	Fair
2B2-3	0	0	0	0	0	--
2B2 Escalante Desert	5,800	27	76	11	3	Fair
Basin Total	63,700	420	69	82	15	Poor

a Length includes sum of all company canals and laterals

b Good - less than 3 percent loss per mile; fair - between 3 and 6 percent loss per mile; poor - greater than 6 percent loss per mile.

TABLE 2.--Irrigation company distribution and conveyance system potential improvement opportunities by 1980, Beaver River Basin

Water budget area and subbasin	Canal lining ^a			Condition ^b	Efficiency Percent
	Open	Pipe	Total		
	Miles	Miles	Miles		
2A-24	27	2	29	Good	88
2A-25a	0	0	0	Good	90
2A-25b	8	2	10	Fair	85
2A Fillmore	35	4	39	Good	88
2B-1	59	6	65	Fair	81
2B-2	2	0	2	Fair	80
2B-3, 4, 6	7	9	16	Good	90
2B-5	1	3	4	Good	86
2B Beaver-Milford	69	18	87	Fair	84
2B1-1c, 2, 4	24	6	30	Fair	84
2B1-1a, 3a	2	0	2	Good	95
2B1-1b, 3b	10	3	13	Fair	88
2B1 Cedar-Parowan	36	9	45	Good	87
2B2-1	3	2	5	Good	92
2B2-2	4	0	4	Good	85
2B2-3	0	0	0	--	--
2B2 Escalante Desert	7	2	9	Good	89
Basin Total	147	33	180	Good	87

a Includes lining for irrigation companies or groups only, regardless of use

b Condition based on following criteria: good - less than 3 percent loss per mile; fair - between 3 and 6 percent loss per mile; poor - greater than 6 percent loss per mile

Canal lining expected to be installed by 1980 under going programs was estimated along with expected conveyance efficiencies and conditions. Projections are based on the assumption that past trends will continue during the projected period. It is projected that by 1980 an additional 88 miles of company canals and laterals will be lined under going programs. This would increase the overall Basin conveyance efficiency to 79 percent and canal conditions to "fair" (Table 3).

Approximately 51 potential reservoir sites were identified within the Basin. Of these, 9 sites appear feasible for irrigation water storage and were further evaluated and analyzed as development opportunities within the next 10 to 15 years. These sites were evaluated on the basis of geology, availability of water, topography, local interest, and better water utilization. Irrigation storage was based upon either storing winter streamflows or storing unused spring diversions for release later in the irrigation season. These nine reservoirs could provide 7,310 acre-feet of irrigation water storage. Two of these sites (Milk Ranch and Indian Creek) are alternates since there is not sufficient irrigation water available for both. Additional discussion and analysis is given in Appendix V.

TABLE 3.--Irrigation company distribution and conveyance system projected improvements under going programs by 1980, Beaver River Basin

Water budget area and subbasin	Canal lining ^a			Condition ^b	Efficiency
	Open	Pipe	Total		
	Miles	Miles	Miles	Percent	
2A-24	15	1	16	Fair	79
2A-25a	0	0	0	Good	90
2A-25b	5	1	6	Poor	82
2A Fillmore	20	2	22	Fair	82
2B-1	14	4	18	Poor	71
2B-2	2	0	2	Fair	80
2B-3, 4, 6	7	2	9	Good	82
2B-5	0	0	0	Poor	66
2B Beaver-Milford	23	6	29	Fair	75
2B1-1c, 2, 4	12	6	18	Fair	78
2B1-1a, 3a	2	0	2	Good	95
2B1-1b, 3b	5	3	8	Poor	79
2B1 Cedar-Parowan	19	9	28	Fair	80
2B2-1	3	2	5	Good	92
2B2-2	4	0	4	Good	85
2B2-3	0	0	0	--	--
2B2 Escalante Desert	7	2	9	Good	89
Basin Total	69	19	88	Fair	79

a Includes lining for irrigation companies or groups only, regardless of use

b Condition based on following criteria: good - less than 3 percent loss per mile; fair - between 3 and 6 percent loss per mile; poor - greater than 6 percent loss per mile

IRRIGATION COMPANIES AND SYSTEMS

This discussion groups irrigation companies and systems by water budget areas and subbasins, starting in the north with Fillmore and then moving south and west to Enterprise. A table summarizing distribution and conveyance systems for each irrigation company is included for each subbasin. Existing ditches and areas served for each irrigation company are shown on a map following the presentation of each water budget area. The discussion for each irrigation company includes present conditions and use, problems and needs, potential solutions or developments, and improvement opportunities by 1980.

FILLMORE WATER BUDGET AREA (2A-24)

The area is served by the Chalk Creek Irrigation Company which diverts water from Chalk Creek, the Pine Creek Irrigation Company which diverts water from Pine Creek, and Central Utah Canal which diverts water from the Sevier River. There is an overlapping of systems where Chalk Creek Irrigation Company and the Central Utah Canal serve some of the same area. The same is true of Chalk Creek and Pine Creek Irrigation Companies. Existing ditches and areas served for these irrigation companies are shown on the map following page 10.

Approximately 9,000 acres are served by these irrigation companies. Company canals and laterals total 51 miles with about 6 miles lined. The overall conveyance efficiency is estimated at 65 percent. Canals are generally in fair condition with a loss between 3 and 6 percent per mile. There is a potential to line about 29 miles of canals and laterals within the next 10 to 15 years. This would increase the conveyance efficiency to about 88 percent and reduce conveyance losses to less than 3 percent per mile (Table 4).

CHALK CREEK IRRIGATION COMPANY

Chalk Creek Irrigation Company is incorporated as a non-profit organization. There are 80 stockholders with 2,868 shares according to the records kept by the secretary. However, the water master uses 2,017.5 shares as his basis for dividing the water among the various company ditches as follows:

<u>Ditch</u>	<u>Shares</u>
Pahvant	317.50
Upper Sink	336
Lower Sink	443
Old Fields highwater	201
Old Fields low water	395
Baldwin*	-
Almond	325

*(Baldwin ditch is a branch of the Old Fields and has no shares).

Chalk Creek Irrigation Company diverts water from Chalk Creek and serves approximately 3,200 acres. The system includes about 34 miles of canals and laterals with 4.8 miles lined, an overall conveyance efficiency of 70 percent (Table 4), and capacities of 18-100 cfs.

The Pahvant ditch has been known to carry up to 300 cfs but the normal is about 100 cfs and is used mostly during periods of high runoff. The ditch is mainly the old original Chalk Creek streambed. The Baldwin ditch serves a small area east and north of the old Chalk Creek channel. However, Interstate Highway 15 crosses through most of this land greatly reducing the area served.

No diversions records are kept by the company beyond the current year. Water is divided to shareholders according to the number of shares owned. Originally one share was issued for every two acres. However, as water has been traded, and bought and sold over the years, this relationship no longer has any significance.

The water is divided or allocated in the following way:

When there is 35 cfs or less, the Sink system gets 19 cfs and the Old Fields gets 16 cfs or a like proportion. (The system is in two general categories - the Sink system and the Old Field system). When there is more than 35 cfs, the high water rights start. The first 35 cfs is still proportioned 19 to 16. The rest goes to those who hold high water shares. When the water reaches 80 cfs, everyone shares equally, and the number of shares in the ditch is multiplied by .04 and that amount is put into the ditch. For instance; the Old Fields ditch with 596 shares would receive 23.8 cfs ($596 \times .04 = 23.8$) for that ditch. As the creek rises each additional 20 cfs, it is multiplied by a number equal to 0.04 plus 0.02 for each additional 20 cfs. For example, when the flow reaches 160 cfs, the Old Fields ditch would receive 47.7 cfs ($596 \times 0.08 = 47.7$).

In addition to this, when the water is at 80 cfs or above, there is a 25 cfs stream routed through Fillmore of which the city receives 14/25. As the stream drops, they still get this proportion of the remaining flow.

When the water is below 35 cfs, those on low water turns rotate the water. The length of time they keep it is determined by the number of shares they own.

Measuring devices and divider structures in the Chalk Creek Irrigation Company are generally inadequate, in poor condition, or non-existent. Streamflow fluctuations and late season water shortages are serious problems throughout the system. Overall conveyance losses are 30 percent.

The Pahvant ditch is a high water loss channel and this ditch system should be completely reorganized. The Old Fields ditch should be completely reorganized and combined for the first part with the Sink system. The Old Fields system is a high loss area and most all structures are inadequate. There is approximately $2\frac{1}{2}$ miles of the Sink system that is a high loss area. All of the Baldwin ditch is in a high loss area, as is the upper end of the Almond ditch.

Reorganizing and combining parts of the Old Fields ditch and Sink ditch has been discussed with officials of the company with favorable response. There is a potential to line over 16 miles of irrigation company canals and laterals within the next 10 to 15 years. Measuring devices, dividers, and turnouts that are inadequate or in poor condition can be repaired or replaced as part of the annual maintenance. A reservoir on Chalk Creek for storing and regulating irrigation water is a potential solution with considerable interest.

PINE CREEK IRRIGATION COMPANY

Pine Creek Irrigation Company is a non-profit corporation with 17 stockholders and 1,343 shares. One share equals 12 minutes of water and there is approximately 1.2 acre-feet per share, but this varies widely from year to year as the water supply varies.

The company diverts water from Pine Creek and serves about 1,100 acres. This stream supplements the water of the Almond ditch on the south end of the area served. The system includes about 8 miles of ditch with 1.2 miles lined. The overall conveyance efficiency is estimated at 65 percent (Table 4). Water runs from about April 15 to July 1 each year. The peak flow is about 25 cfs and averages around 12 cfs for 6 weeks and then drops to 5 or 6 cfs for 6 weeks. The water is all kept in one stream and rotated every 7 days unless individual users work out private arrangements to split it. No measurements are made and no records kept.

Streamflow fluctuations and late season water shortages are serious problems. High water loss occurs from the end of the present lining to where the stream crosses Highway-91. Slopes are steep and erosion is a hazard.

There is an opportunity to line an additional 5 miles of the system within the next 10 to 15 years. Control structures can be installed on a continuing basis as part of the maintenance program.

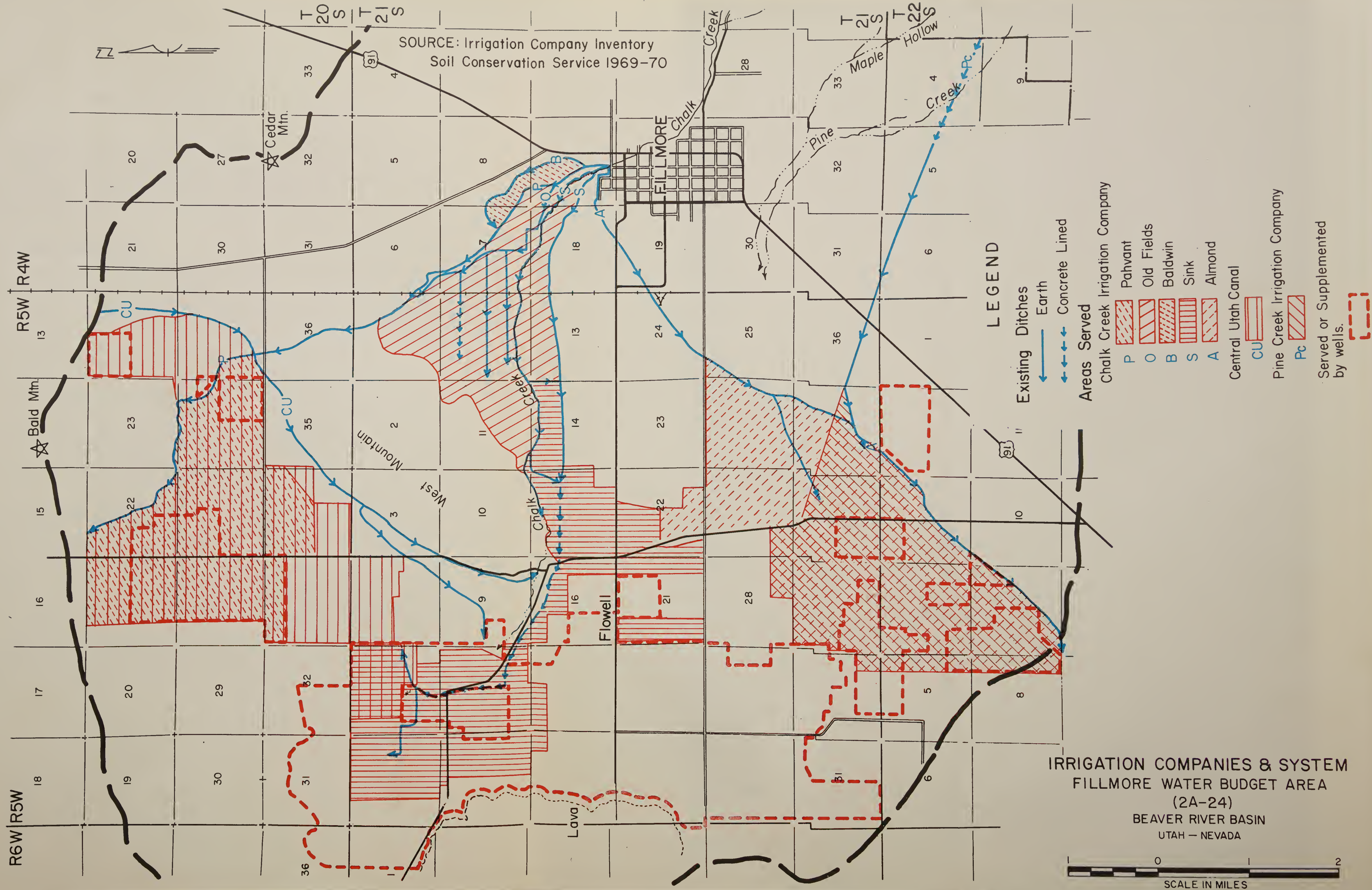
CENTRAL UTAH CANAL

Additional information concerning this canal company is given in the Sevier River Basin Appendix II "Water Supply", Appendix XV "Early Action Program", and the Summary Report.

The canal serves 11,334 acres of which 4,750 acres are in the northwest part of the Fillmore water budget area. The 1931-1960 average annual diversion from the Sevier River into the Canal was 29,390 acre-feet. Delivery records indicate that the overall delivery to the farm has been 49 percent efficient. Conveyance efficiencies within the Beaver River Basin are estimated at 61 percent. The 1967 diversions were at a low 6,000 acre-feet which was delivered at 100 cfs for a 30-day period in April. The rights to Sevier River waters are set by the Cox's Decree.

The canal is 52.1 miles long of which 8.8 miles is within the water budget area. Water losses are large in this canal due to the long length and sections of very permeable soils through which the canal passes. Supply fluctuations are very extreme. Operation and maintenance is difficult to hazardous.

Potential solutions include lining the entire 52.1 miles of Canal, lining critical sections of the Canal, pumping part of the supply from the DMAD reservoir, obtaining additional water supply from the Central Utah Project, and a combination of these. There is an opportunity to line 7.9 miles of the Central Utah Canal that is within the Fillmore water budget area by 1980.



MEADOW WATER BUDGET AREA (2A-25a)

This area is served by Meadow Irrigation Company, and Dry Creek users. There are approximately 4,500 acres served in this area by over 16 miles of canals and laterals, most of which are lined and in good condition. Conveyance efficiencies are estimated at 90 percent (Table 4). Existing ditches and areas served are shown on the map following page 11.

MEADOW IRRIGATION COMPANY

This irrigation company serves approximately 4,350 acres and is an incorporated, non-profit company. There are 68 stockholders holding 297 shares with an average annual delivery of about 5 acre-feet per share. Water is diverted from Meadow Creek and conveyed by a concrete lined canal with a 30 cfs capacity and an old rock-lined ditch with a 15 cfs capacity. During normal years these two conveyance systems are adequate but on years of high runoff the overflow is released down the old channel to be recovered east of town, and distributed in the several canals and laterals. The Meadow Irrigation Company also owns one-half the water of Dry Creek which is delivered to the farms in a lined ditch with a 25 cfs capacity. The area is supplemented by wells throughout. No measurements are made or records kept of water supplies. The water master makes an honest effort to divide the water to users based on individual shares. During high water in the spring, there may be 5 equal streams and by mid-summer there may be only one.

All of the company ditches are lined except for about 2.2 miles of the Old Meadow Creek channel which is used only for high water bypass but has a high water loss. This system is in good condition and no improvements were identified.

DRY CREEK

One-half of the water from Dry Creek is owned by a group of farmers. Water is conveyed to the farms most of the way through a lined canal with a capacity of 25 cfs. Problems are encountered at the diversion on Dry Creek with sediment and flooding and there is a potential for a debris basin at this point.




LEGEND


Existing Ditches

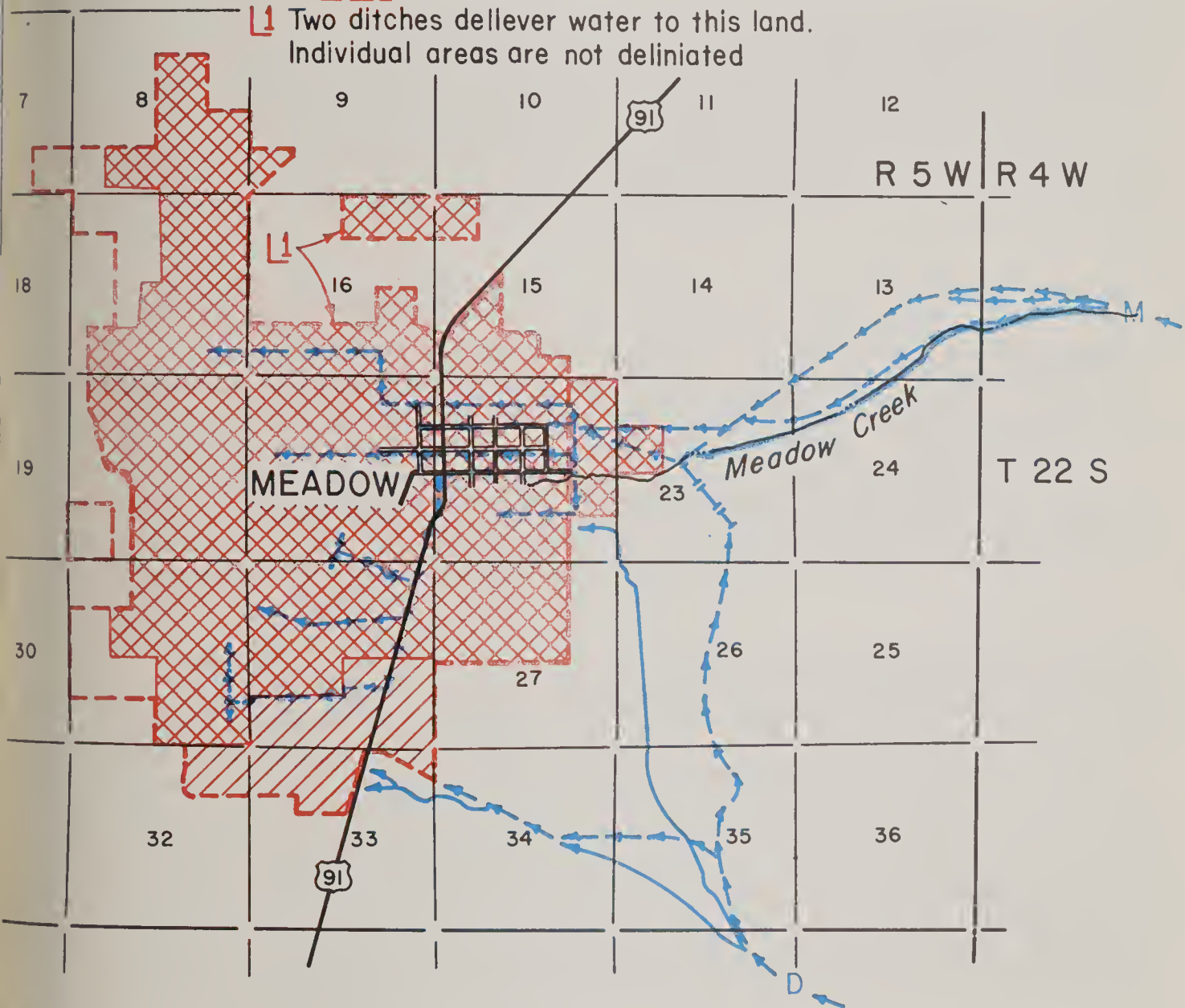
SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70

- ← Earth
- ← Concrete Lined

Areas Served

- D  Dry Creek
- M  Meadow Irrigation Company
-  Served or Supplemented by wells

 Two ditches deliver water to this land.
Individual areas are not delineated



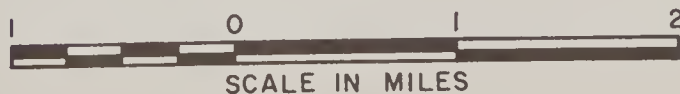
IRRIGATION COMPANIES & SYSTEMS

MEADOW WATER BUDGET AREA

(2A-25a)

BEAVER RIVER BASIN

UTAH-NEVADA



SCALE IN MILES

KANOSH WATER BUDGET AREA (2A-25b)

The Corn Creek Irrigation Company, Cottonwood Irrigation Company, and Dry Wash users serve this water budget area. The Cottonwood ditch supplements the area covered by Corn Creek Irrigation Company's East Field ditch. Part of the area is also supplemented by wells. Existing ditches and areas served for these irrigation companies are shown on the map following page 13.

There are approximately 5,300 acres served by irrigation companies in this area. Systems include 24 miles of canals and laterals with about 9 miles lined. The overall conveyance efficiency is estimated at 66 percent and canals are generally in "poor" condition. There is a potential opportunity to line an additional 10 miles of canals within the next 10 to 15 years. This would increase the conveyance efficiency to 85 percent and improve the canals to a "fair" condition (Table 4).

CORN CREEK IRRIGATION COMPANY

The Corn Creek Irrigation Company is a non-profit corporation with 140 stockholders holding 1,969.25 shares. Approximately 4,000 acres are served by this company with an average annual delivery of 4 acre-feet per acre. Water is diverted from Corn Creek near its mouth and irrigates land west and north of Kanosh. Some of the area is supplemented by wells and by water from Cottonwood Irrigation Company. There are about 19.3 miles of canals and laterals in this system with 9 miles lined. Estimated overall irrigation conveyance efficiency is 67 percent.

Water is divided into 5 streams early in the season and 3 later as flow diminishes. No records are kept and no measurements taken of amount actually in streams. The five streams are East Fields, Hatton, Middle Fields, West Fields, and South Fields (Town Ditch). The area served under the East Field Ditch is also partially served by wells and by the Cottonwood Irrigation Company. Most of this ditch system is lined and has a capacity of 20 cfs. Most of the Hatton ditch that is used during low flow is lined and has a 40 cfs capacity. The Middle Fields Ditch has a capacity of 30 cfs and none of the ditch is lined. The West Fields Ditch is all lined with the exception of a small section in town. Capacity is 30 cfs. The South Fields Ditch (also known as Town Ditch) has a capacity of 30 cfs and is all lined but is breaking up in places.

A small reservoir immediately east of Kanosh, in the mouth of Corn Creek, provides some protection from floodwater and sediment damage to the irrigation systems as well as providing a regulating effect to daily streamflow fluctuations. This reservoir is the diversion point for the Corn Creek Irrigation Company.

Corn Creek Irrigation Company needs much repair on their system and additional lining. Also, parts of this system could be reorganized for better distribution efficiency. East Fields and Hatton Ditches have about one mile each in high loss areas that should be lined. Middle Fields Ditch is all in a high loss area with a need for reorganization and lining. The South Fields Ditch is in need of repairs. There appears to be a high water loss because of the breaking up of the lining. There is a shortage of late season water throughout the system. The reservoir at the mouth of Corn Creek has only a 20 acre-foot storage capacity and leaks badly.

There is a potential to line 7 miles of irrigation company canals and laterals within the next 10 to 15 years. The Middle Fields Ditch has a potential for reorganization. There are two potential reservoir sites for irrigation water storage and regulation - one on Big Hollow and one on Cottonwood tributary to Corn Creek.

COTTONWOOD IRRIGATION COMPANY

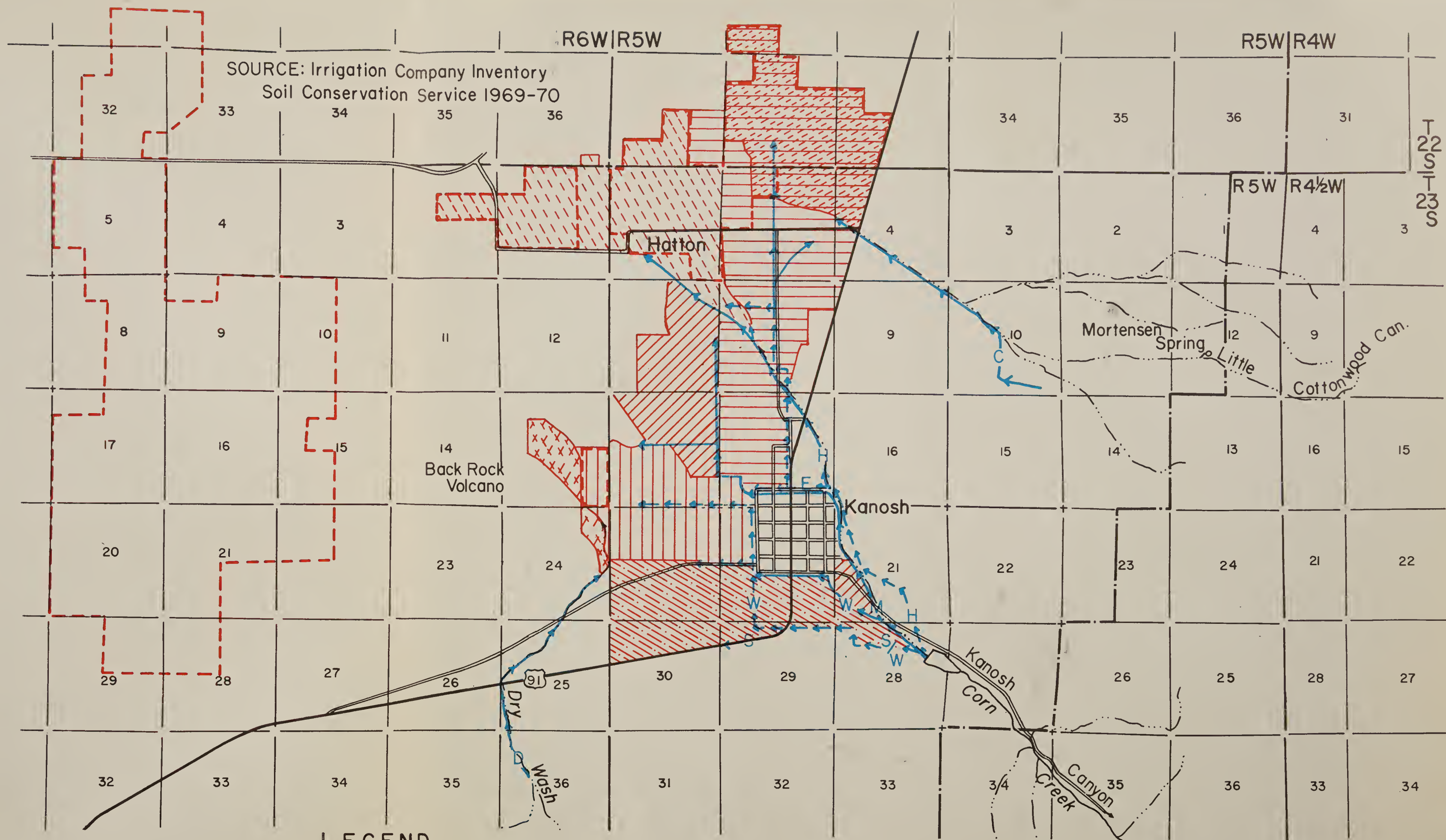
This is an unincorporated company with 3 stockholders and 8 shares, serving approximately 800 acres. This system supplements the area covered by the Corn Creek Irrigation System's East Field Ditch. Water is diverted from Cottonwood Canyon and averages about 8 cfs during May and 4 cfs during June. One share equals one day of water every 8 days. All water is kept in one stream and rotated on an 8 day cycle. There is about 2.7 miles of ditch with a 20 cfs capacity and an estimated conveyance efficiency of 65 percent.

Water is available only in the spring or periods of high runoff. The entire ditch is in a heavy loss area.

Cottonwood Irrigation Company has plans for installing either concrete lining or (preferably) irrigation pipeline from the mouth of the canyon to the crossing at Highway 91, a distance of approximately 2 miles. This could be accomplished within the next 10 to 15 years.

DRY WASH

Dry Wash is an unincorporated group of 7 water users and each user has a given number of water-use hours every 16 days. The group serves about 500 acres west of Kanosh. Water is diverted from Dry Wash and averages about 7 cfs for 30 days in the spring. All water is kept in one stream and rotated on a 16-day cycle. There is about 2 miles of ditch with a 20 cfs capacity and an estimated conveyance efficiency of 60 percent. This is all early runoff water with high water loss. The group plans to install pipeline on the first section for about 1 mile. This could be done within the next 10 to 15 years.



Existing Ditches

- ← Earth
- ←← Concrete Lined

Areas Served

Corn Creek Irrigation Company

- E East Fields
- M Middle Fields
- H Hatton
- W West Fields
- S South Fields

Cottonwood Irrigation Company

- C Dry Wash
- D Served or Supplemented by wells.

IRRIGATION COMPANIES & SYSTEMS

KANOSH WATER BUDGET AREA

(2A-25b)

BEAVER RIVER BASIN

UTAH — NEVADA

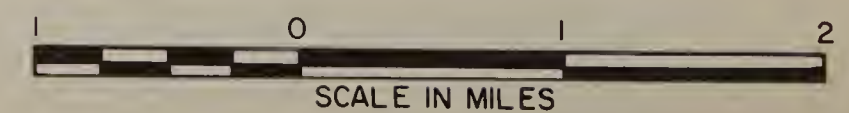


TABLE 4.--Irrigation company distribution and conveyance system summary, Fillmore subbasin, Beaver River Basin

Irrigation Company and water budget area	Area served Acre	Existing condition (1965)					Improvement opportunity by 1980				
		Canal length ^a Miles	Conveyance efficiency Percent	Canal lining		Total Miles	Conveyance efficiency Percent	Canal lining ^b		Total Miles	
				Open Miles	Pipe Miles			Open Miles	Pipe Miles		
Chalk Creek	3,200	34.2	70	4.8	0	4.8	89	16.1	0	16.1	
Pine Creek	1,050	8.0	65	1.2	0	1.2	88	3.0	2.0	5.0	
Central Utah Canal	4,750	8.8	61	0	0	0	87	7.9	0	7.9	
2A-24 Fillmore	9,000	51.0	65	6.0	0	6.0	88	27.0	2.0	29.0	
Meadow	4,350	14.2	90	11.0	1.0	12.0	90	0	0	0	
Dry Creek	150	2.0	85	1.0	0	1.0	85	0	0	0	
2A-25a Meadow	4,500	16.2	90	12.0	1.0	13.0	90	0	0	0	
Corn Creek	4,000	19.3	67	9.0	0	9.0	86	7.0	0	7.0	
Dry Wash	500	2.0	60	0	0	0	80	0	1.0	1.0	
Cottonwood	800	2.7	65	0	0	0	84	1.0	1.0	2.0	
2A-25b Kanosh	5,300	24.0	66	9.0	0	9.0	85	8.0	2.0	10.0	
2A Fillmore subbasin Total	18,800	91.2	69	27.0	1.0	28.0	88	35.0	4.0	39.0	

a Length includes all company canals and laterals

b In addition to existing lining in 1965

BEAVER-GREENVILLE WATER BUDGET AREA (2B-1)

There were 18 irrigation companies or groups identified and inventoried in this water budget area. Also, there are about as many more individual water users and private ditches. Water supply is mainly from the Beaver River, North Creek, and South Creek but three companies receive supplemental water from wells. There is overlapping of systems in several places where land is served by more than one irrigation company or ditch. Considerable opportunity exists for reorganization. These irrigation companies serve areas ranging in size from 110 to 2,700 acres and serve a total of 12,500 acres. There are about 141 miles of canals and laterals maintained and operated by these 18 companies ranging in length from less than 2 miles to 25 miles. Less than 4 miles are lined. The overall conveyance efficiency is estimated at 64 percent and canals are generally in "poor" condition with losses over 6 percent per mile. There is potential opportunity to line 65 miles of canals and laterals within the next 10 to 15 years. This would increase the conveyance efficiency to 81 percent and improve the canals to a "fair" condition. Additional information on the existing conditions and improvement opportunities for the irrigation companies is given in Table 5. Existing ditches and areas served are shown on the map following page 22.

ABERDARE BENCH CANAL COMPANY

This company is a non-profit corporation serving about 800 acres immediately upstream from the Minersville reservoir. Water diverted from the Beaver River averages about 9 cfs and is supplemented by water from wells. There are about 7.1 miles of canals in the system which run through wet meadow areas and over dry shallow bench soils. The overall conveyance efficiency is estimated at 60 percent.

River water is usually inadequate for the irrigation season. One well constructed just above the diversion was inadequate. Another well was drilled in about 1962 which is a very good well and should assure an adequate water supply. Some flooding occurs from summer thunderstorms. The diversion structure and other control structures and headgates along the canal are in poor condition.

A new diversion structure on the Beaver River, a control structure at Devil Creek, new headgates along the canal, and lining about 5.5 miles of the canal are all opportunities within the next 10 to 15 years.

FURNACE DITCH COMPANY

This is an incorporated company serving about 300 acres at Adamsville just upstream from the Minersville reservoir. Water is diverted from the Beaver River and averages 4.5 cfs. The water right allows for 7.57 cfs. The system contains about 3.3 miles of canal of which 1.7 miles are lined. The overall conveyance efficiency is estimated to be 80 percent. Furnace and South Ditch use a common diversion structure which is adequate except for gravel which collects above the diversion and requires continual operation of the sluice boards. Lining an additional mile of canal is an opportunity in the next 10 to 15 years.

SOUTH DITCH

This is an unincorporated group of water users which serves about 110 acres between the areas served by the Aberdare and Furnace canals. Water is diverted from the Beaver River with a structure common to the Furnace Ditch and averages a little over 2 cfs. There are about 1.8 miles of ditches in the system, none of which is lined. There is a potential to line about one mile within the next 10 to 15 years. The present conveyance efficiency is estimated at 70 percent.

BARTON DITCH ASSOCIATION

This association serves about 440 acres on the south side of the Beaver River south of Greenville and immediately upstream from the area served by Aberdare Bench Canal. Water is diverted from the Beaver River and Devil Creek, and supplemented by wells. Average maximum diversion from the Beaver River is about 3.5 cfs. There are about 3 miles of ditch in the system with an estimated conveyance efficiency of 60 percent.

River water is usually inadequate late in the season. Some flooding occurs during spring runoff and summer thunderstorms. The diversion structure and other control structures and headgates are in poor condition. Water losses are high on the lower end of the system.

Lining about 1.5 miles of canal, along with appurtenant structures, are possible solutions within the next 10 to 15 years.

PATTERSON DITCH

This is an unincorporated group serving about 640 acres on the south side of the Beaver River southwest of Beaver City. Maximum flow diverted from Beaver River averages about 12 cfs. There are an estimated 12 miles of ditches in this system including many laterals for individual use. Conveyance efficiency is estimated at 60 percent.

River water is usually inadequate late in the season. Water losses in the ditches are high. Flooding occurs frequently on the Beaver River and along the hillside on portions of the system. Structures are in poor condition.

There is an opportunity for reorganization within the system and about 3 miles of canal lining on the lower end.

SOUTH CREEK WATER USERS

This is an unincorporated association with 6 members serving about 700 acres south of Beaver City and adjacent to South Creek. Water is diverted from South Creek and the maximum diversion averages about 12 cfs early in the year. The system includes about 6 miles of ditch with an estimated conveyance efficiency of 60 percent.

This stream is fed by spring snowmelt. Due to heavy spring runoff and flash floods caused by heavy summer rains, this group suffers much flood damage. Ditches are washed out, headgates ruined, cropland flooded and eroded, and channels deepened and widened. They also lose much of their valuable water by this runoff which could be used for irrigation later on in the summer if storage were available. In wintertime this stream runs a small amount of water which keeps freezing back, causing it to overflow onto cropland where it freezes and causes crop damage.

Potential solutions include lining about 4.5 miles of the canal and installing appropriate appurtenant structures.

MAINTH CANAL AND IRRIGATION COMPANY

Irrigation water is diverted from the Beaver River and delivered to about 1,400 acres of cropland northeast of Beaver City through 11.5 miles of canals and laterals. The average diverted flow is about 19 cfs and the conveyance efficiency is estimated at 60 percent. Much of the Maimoth canal traverses a steep hillside and parallels the Willis and Second Northeast Bench Canals (Harris Ditch) for several miles. There are some willows along the canal. The company is incorporated.

The canals are constructed in gravelly soils and seepage losses are high. There have been several washouts, probably due to lower bank saturation and slippage. Maintenance costs are high. Stream-flow fluctuates greatly and water is usually gone by the last of July. Storage is needed if a feasible site can be found and some flow rights changed to storage rights.

Irrigation system reorganization, including a regulating reservoir near the present diversion point, 10 miles of canal lining, and

various water control structures are potential improvements within the next 10 to 15 years. Another potential solution is to consolidate the Mammoth, Willis, and Harris systems.

SECOND NORTHEAST BENCH CANAL AND IRRIGATION COMPANY

This company (also known as the Harris Ditch) is a non-profit corporation serving about 670 acres northeast of Beaver City. Water is diverted from the Beaver River and the average maximum flow is about 17 cfs. The system includes about 11.5 miles of canals and laterals with an estimated conveyance efficiency of 60 percent. Much of this system parallels the Mammoth and Willis Canals for several miles and willows exist along the upper section.

Ditches are in gravelly soils and water losses are quite high. Streamflow fluctuates, water is all high water rights and usually terminates during July.

One potential solution includes reorganization and consolidation with the Mammoth and Willis canals. There is also an opportunity to line 7 miles of canals and laterals within the next 10 to 15 years.

WILLIS CANAL AND IRRIGATION COMPANY

The Willis Irrigation system includes about 6 miles of canals and laterals much of which parallels the Mammoth and Harris Canals with willows along the upper sections and high seepage losses. Conveyance efficiency is estimated at 60 percent. This is a non-profit corporation serving about 500 acres north and east of Beaver City. No water is being diverted above the golf course at present. Much of this upper area is being subdivided. Water is diverted from the Beaver River and rights are practically all for high water. Maximum flow diverted averages about 12 cfs.

Seepage losses are quite high. Water usually runs out during July. There is considerable fluctuation in streamflow. Maintenance is difficult and costly.

There is a potential opportunity to line about 1.5 miles within the next 10 to 15 years. Another solution includes reorganization and consolidation with the Mammoth and Harris canal systems.

SECOND SOUTH BENCH RESERVOIR AND IRRIGATION COMPANY

This is a non-profit corporation also known as the Owens ditch with 12 stockholders and 5,800 shares. It serves about 500 acres on the bench southeast of Beaver City. Water rights include storage of 420 acre-feet in Three-Creeks Reservoir and Kent's Lake, and 325 acre-feet in Twin-Lakes Reservoir which is not useable at present.

A maximum of 8 cfs is diverted from the Beaver River and delivered through about 6 miles of canal at an estimated conveyance efficiency of 60 percent. About 3 miles of this canal runs along the steep, unstable south side of Beaver Canyon.

In the last few years there have been several large sloughs or washouts and in several areas the bank has been rocked up. A lot of cleaning and other maintenance work is required each year. Seepage losses are quite high. Some water is usually available through July.

There is considerable interest in reorganizing the system. This includes diverting the South Bench water along with the Mammoth Canal water down to about the penstock, then using an inverted siphon across the canyon to bring the water back to the South Bench canal, thus bypassing the more hazardous sections. This would require enlarging the Mammoth Canal, and installing about 1.5 miles of pipeline and 2 miles of lining with necessary structures. Also, Twin-Lakes Reservoir should be repaired or the water right transferred to another reservoir.

BEAVER CITY CORPORATION

This corporation serves about 520 acres in Beaver City and immediately south of the city. Water is diverted from the Beaver River and delivered through about a two mile long canal. This canal is also used to deliver water to the West Field (Tanner), Second Northwest, and Lindsey Ditches. Average maximum diversion is about 60 cfs for all users. Estimated conveyance efficiency is 65 percent.

Seepage losses are fairly high due to gravelly soils. Stream-flow fluctuates but water is all primary water rights.

There is an opportunity to line about one mile of this joint-use canal along with the necessary diversion and control structures by 1980. There is also a potential opportunity to convert the delivery and distribution to a pipe pressure system.

SECOND NORTHWEST CANAL AND IRRIGATION COMPANY

This is a non-profit corporation serving about 700 acres northwest of Beaver City. Part of this area is also served by the West Side Irrigation Company. Water is diverted from the Beaver River and delivered to the Northwest system through the joint-use Beaver City Canal. Average maximum delivery to the Northwest system is about 18 cfs. There are approximately 8 miles of canals and laterals with an estimated conveyance efficiency of 60 percent.

Canals are constructed on gravelly soils and seepage losses are high. Some flooding occurs during spring runoff and ditch maintenance is a problem.

In the next 10 to 15 years, there is an opportunity to line about 2.5 miles of canal including appurtenant structures.

WEST FIELD CANAL AND IRRIGATION COMPANY

This is a non-profit corporation also known as the Tanner Ditch. It serves about 600 acres immediately west of Beaver City. Water is diverted from the Beaver River and delivered to this canal through the joint-use Beaver City Canal. The West Field System contains about 5.7 miles of ditches with an estimated conveyance efficiency of 60 percent. The maximum average stream diverted to this system is about 16 cfs.

Conveyance losses are fairly high due to seepage in gravelly soils and unauthorized use through the city. Maintenance is difficult particularly through town.

Potential solutions include lining about 2 miles in the next 10 to 15 years including appropriate control structures.

LINDSEY DITCH ASSOCIATION

This is an unincorporated group serving about 110 acres immediately southwest of Beaver City. Water is delivered from the Beaver River via the joint-use Beaver City Canal. The Lindsey Ssystem contains about 2 miles of canal most of which runs through Beaver City. The maximum delivery to this system averages about 8 cfs but the normal delivery is about 2.5 cfs. The estimated conveyance efficiency is 70 percent.

Problems on the system through Beaver City include heavy grass on the banks, trash, and unauthorized water use.

Solutions to these problems include one mile of pipeline through town and open lining for the rest of the system. This could be accomplished within the next 10 to 15 years.

COUNTY ROAD DRAIN

This system serves about 150 acres north of Greenville, part of which is also served by the West Side Irrigation Company. Water is supplied from springs, seepage, and return flows which empty into the drainage ditch along Highway 21. Supply varies but is usually about 1.5 cfs. The system begins on the west edge of Beaver City and includes about 4.5 miles of ditch with an estimated conveyance efficiency of 60 percent.

Water losses are high on the lower end of the system where ditches cross gravelly soils. Moss in the ditch and vegetative growth along the banks create difficult maintenance problems in some sections.

There is an opportunity to line about one mile of the system on the lower end within the next 10 to 15 years.

SECOND SOUTH FIELD DITCH COMPANY

This company is a non-profit corporation serving about 400 acres south of Beaver City on the South side of Beaver River. Water is diverted from the Beaver River and supplemented by water from springs. Water rights are for over 7 cfs but late season flows are seldom more than 2 cfs. The Ditch is about 2 miles long with an estimated conveyance efficiency of 65 percent.

Water loss is fairly high on the lower end due to permeable soils. Maintenance is difficult due to vegetative growth and sediment. The diversion structure needs repair.

Approximately one mile of the ditch could be lined by 1980 along with necessary diversion and control structures.

NORTH CREEK IRRIGATION COMPANY

This company is incorporated and serves about 2,700 acres northeast of Beaver City. Water is diverted from North Creek and varies from about 45 cfs in the spring to less than 10 cfs in August. The flow is divided into about 5 cfs streams for irrigation. There are about 21 miles of ditches in the system including Last Chance, Upper Last Chance, Gale, North, Joe Moyes, Schoolhouse, Knox, Van Valeet, and a few other smaller ones. Conveyance efficiency is estimated at 70 percent. The company has 500 acre-feet of storage in Blue Lake which is usually utilized during July.

There is serious gravel sedimentation at the diversion and some other areas during spring runoff and heavy summer storms. Stream fluctuation is another serious problem. Seepage losses are high in some of the ditches. Measuring devices and a new diversion at North Creek are needed.

Some of the users are interested in lining their ditches and it is estimated that 11 miles of lining could be installed in the next 10 to 15 years. Reorganization and consolidation of portions of the North Creek and West Side Irrigation Companies is also a potential solution. Plans and specifications were proposed in 1964 for a ditch consolidation and lining project by the "North Bench Group". This unincorporated group included users on the Last Chance and Gale Ditches of the North Creek Irrigation Company and the Frazier Ditch of the West Side Irrigation Company. The proposal included consolidation of these ditches and lining about 3.2 miles of ditch with appurtenant structures. Financing arrangements could not be finalized and the project did not materialize.

There is a potential reservoir site on the North Fork of North Creek for limited irrigation water storage and regulation.

WEST SIDE IRRIGATION COMPANY

This is an incorporated company with 54 members serving approximately 1,300 acres north and west of Beaver City. Part of this area is also served by the Northwest Irrigation Company, the County Road Drain, and the North Creek Irrigation Company. Water is diverted from North Creek and distributed in an estimated 26 miles of ditches (of which 1.9 miles are lined) including Frazier, Carter, North Field, and Johnny Smith ditches.

Seepage losses are high. Most soils are shallow and highly permeable and contribute to water shortages. This is especially critical during dry years and in late summer. High sedimentation occurs during spring runoff. Diversions and water control structures are in poor condition and measuring devices are needed.

Some of the ditches have potential for lining and an estimated 6 miles could be lined within the next 10 to 15 years. New diversion and measuring structures, reorganization and consolidation of portions of the west side and North Creek Irrigation Companies, and a small storage and regulating reservoir on the North Fork of North Creek are potential solutions. Additional discussion is given under "North Creek Irrigation Company".


LEGEND

Existing Ditches


← Earth

← Concrete Lined

Areas Served


A  Aberdare Bench Canal Co.

F  Furnace

M  Mammoth Canal & Irrigation Co.


SB  2nd South Bench Reservoir & Irrigation Co.


NE  2nd N.E. Bench Canal & Irrigation Co.

N  North Creek Irrigation Co.


WS  West Side Irrigation Co.


W  Willis Canal & Irrigation Co.


L  Lindsey Ditch Asso.

WF  West Field Canal & Irrigation Co.

NW  2nd N.W. Canal & Irrigation Co.

SF  2nd South Field Ditch Co.


SC  South Creek Water Users


S  South Ditch

C  County Road Drain

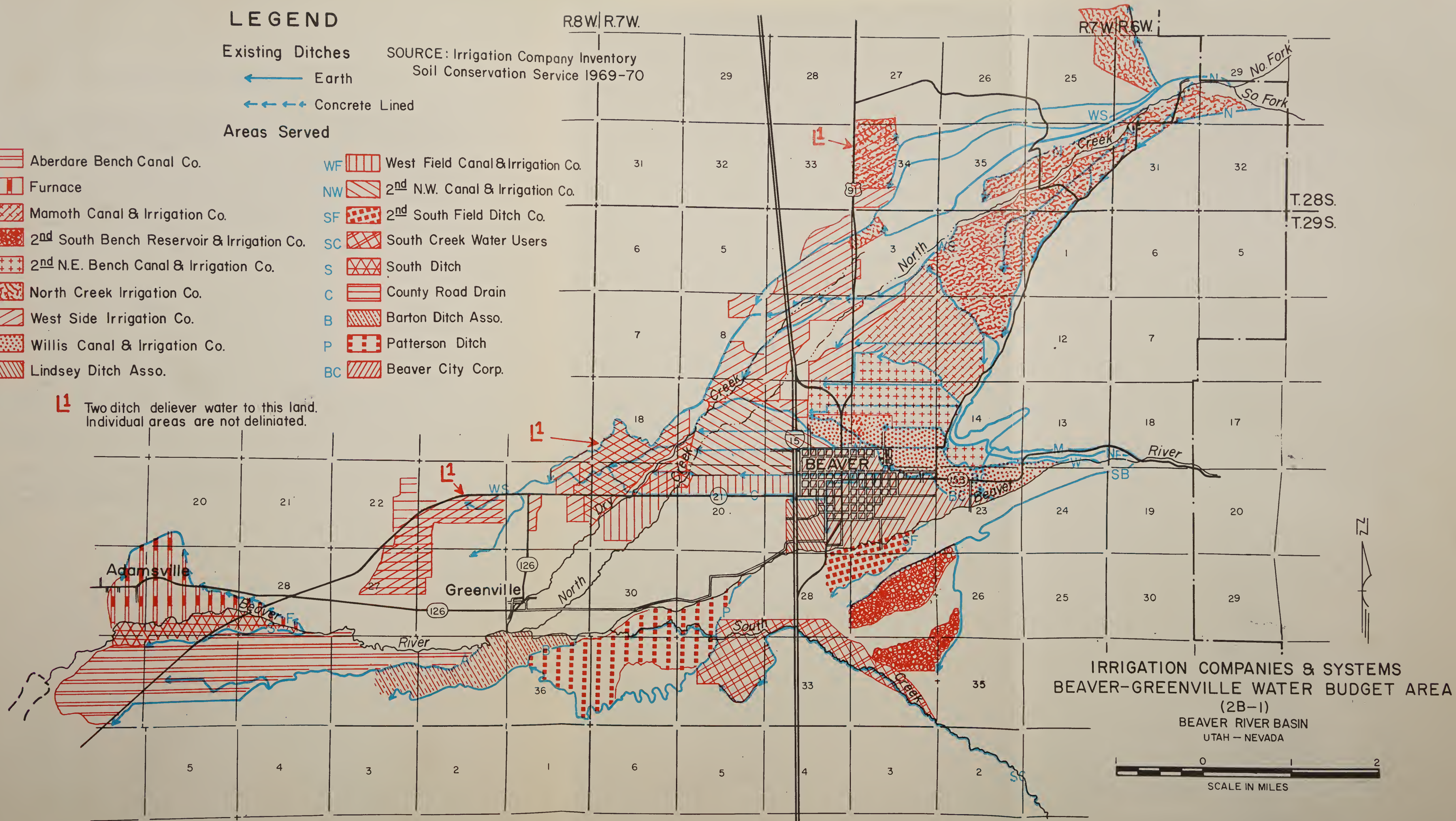
B  Barton Ditch Asso.

P  Patterson Ditch

BC  Beaver City Corp.

 Two ditch deliver water to this land. Individual areas are not delineated.

SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70



IRRIGATION COMPANIES & SYSTEMS
BEAVER-GREENVILLE WATER BUDGET AREA
(2B-1)

BEAVER RIVER BASIN
UTAH - NEVADA

0 1 2
SCALE IN MILES

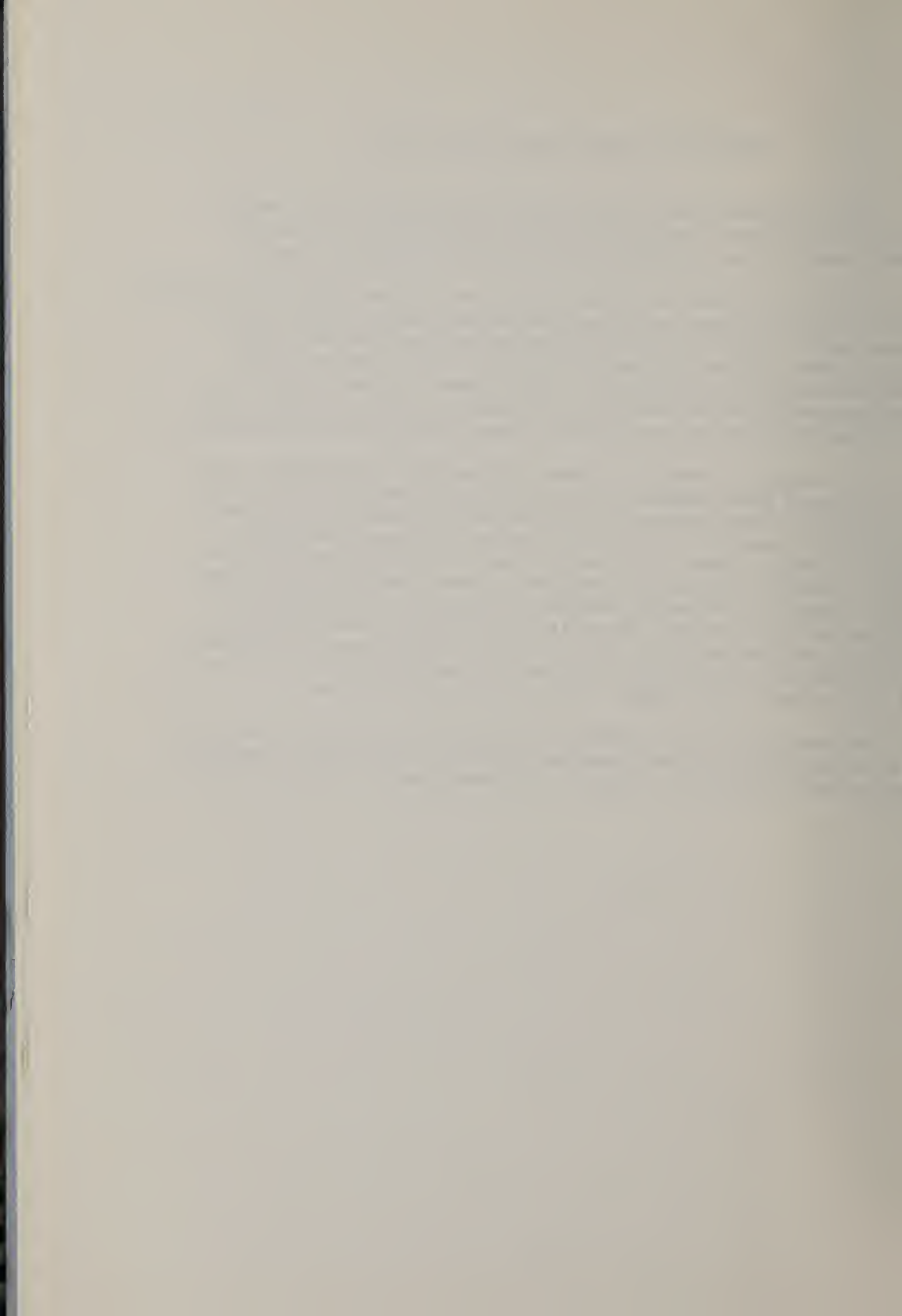
MANDERFIELD WATER BUDGET AREA (2B-2)

Only the Manderfield Irrigation and Reservoir Company serves water users in this water budget area. Information on existing conditions is given in Table 5 and on the map following page 23.

This is a non-profit company incorporated since 1875 with 13 stockholders and 336 shares and serves about 1,500 acres in and around Manderfield. Water is diverted from Indian Creek and delivered through about 7 miles of canal including 3 miles that is lined. Estimated conveyance efficiency is 65 percent. A small area is supplemented by well diversions. The company holds a storage right for about 300 acre-feet at the Milk Ranch Site which is yet undeveloped.

The company is unable to store high water in the spring. Most of the runoff from snowmelt comes too early for most effective use and crops lack water in the latter part of the season. The company would like a storage reservoir just below the present diversion point on Indian Creek or at the Milk Ranch Site upstream on Indian Creek. Summer thunderstorms frequently cause floods or high water, which causes the irrigation streams to fluctuate, erodes fields, and causes other damage. There is a high seepage loss in the old earth ditch from the point of diversion at Indian Creek to the head of the present lined section. There is also need for a new diversion on Indian Creek and lining of some of the group ditches.

Potential solutions within the next 10 to 15 years include about 2 miles of lining, a new diversion structure, and a small regulating and storage reservoir at either the Indian Creek or the Milk Ranch sites.



LEGEND

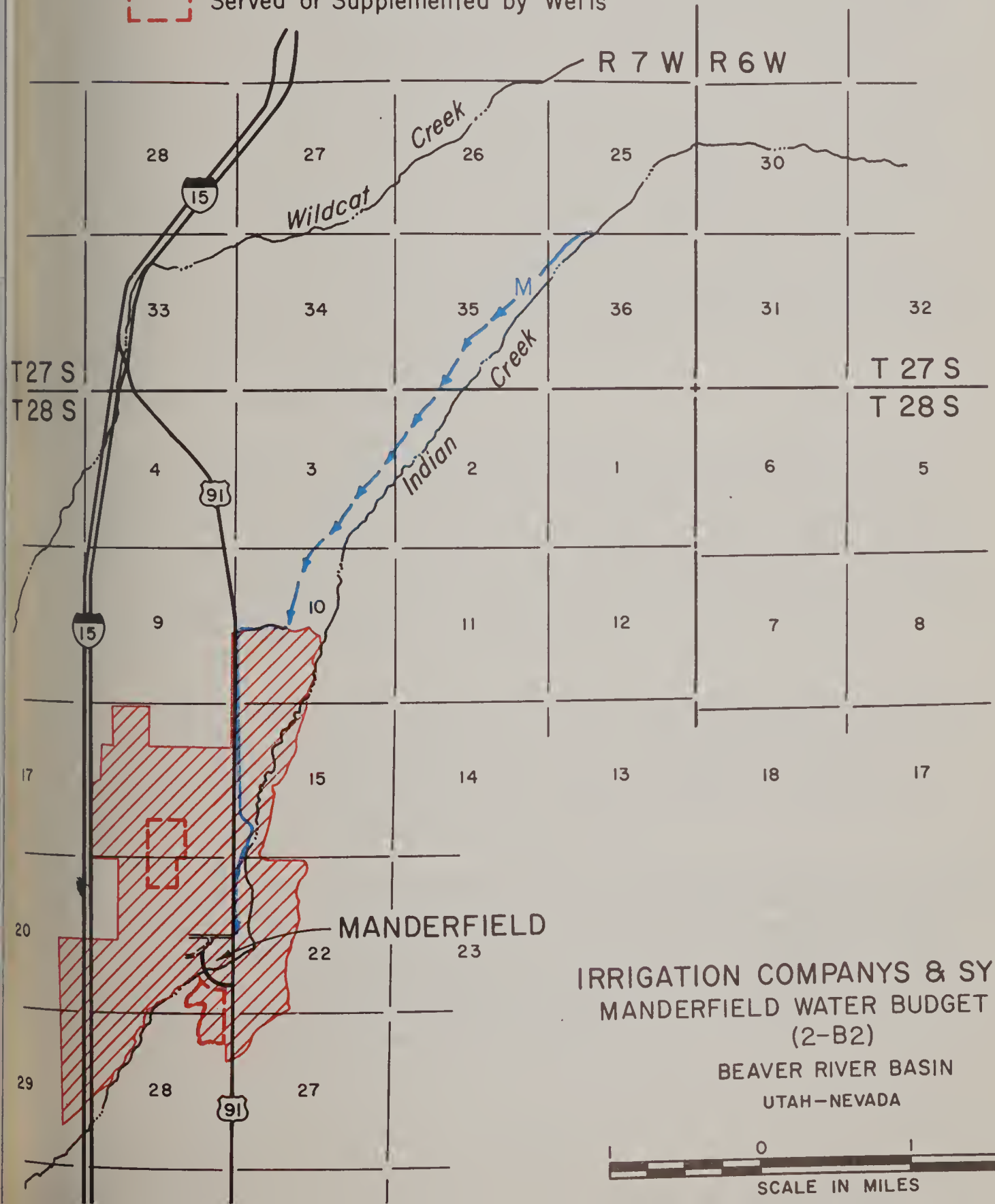
SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70

Existing Ditches

- Earth
- Concrete Lined

Areas Served

- M Manderfield Irrigation Company
- Served or Supplemented by Wells



IRRIGATION COMPANYS & SYSTEMS
MANDERFIELD WATER BUDGET AREA
(2-B2)

BEAVER RIVER BASIN
UTAH-NEVADA



MINERSVILLE-MILFORD WATER BUDGET AREA (2B-3,4,6)

Approximately 6,000 acres in this area are served by the Rocky Ford and Minersville Irrigation Companies. The water supply is mainly winter and spring runoff which is stored in the Minersville Reservoir located about 6 miles east of the town of Minersville on the Beaver River. This reservoir has an active capacity of 23,260 acre-feet and an average annual storage, at the beginning of the irrigation season, of about 17,000 acre-feet. Systems include 29 miles of canals and laterals of which about 6 miles is lined. The conveyance efficiency for the area is estimated at 73 percent and canals are generally in "fair" condition with losses between 3 and 6 percent per mile. There is an opportunity to line 16 miles of canals and laterals by 1980 which would increase the conveyance efficiency to 90 percent and the condition to "good". Additional information on the existing conditions and improvement opportunities is given in Table 5. Existing ditches and area served are shown on the map following page 25. These Irrigation Company systems are within the Minersville Watershed PL-566 project, and reorganizing and lining parts of the systems are included in the program.

MINERSVILLE IRRIGATION COMPANY

This company serves approximately 2,000 acres immediately west of Minersville. It is incorporated with 113 stockholders. The company has the right to the first 7,500 acre-feet from Minersville Reservoir, which is diverted from the Beaver River on a call basis at a rate not to exceed 30 cfs. The median monthly diversion supply is estimated to be 3.75 acre-feet per acre and this amount has been available 50 percent of the time. The system includes about 12 miles of canals and laterals, 4 of which have been lined. Conveyance efficiency is estimated at 73 percent.

Much water is lost through the distribution system to seepage, evaporation, and use by weeds and willows along the canals. Existing canal lining has been seriously affected by sediment and flood damage and by leaving water in the canals during the winter. Interruption in the water delivery is a serious problem. The majority of the system is located in permeable soils.

There is a potential opportunity to reorganize the entire irrigation system by 1980. This would include 9 miles of new pipeline, replacement of existing lining with pipe, a new diversion structure on the Beaver River, and other appurtenant structures. The present system would be obliterated and the new system would be underground. Debris basins and diversion dikes proposed under the PL-566 watershed project for flood protection have been completed.

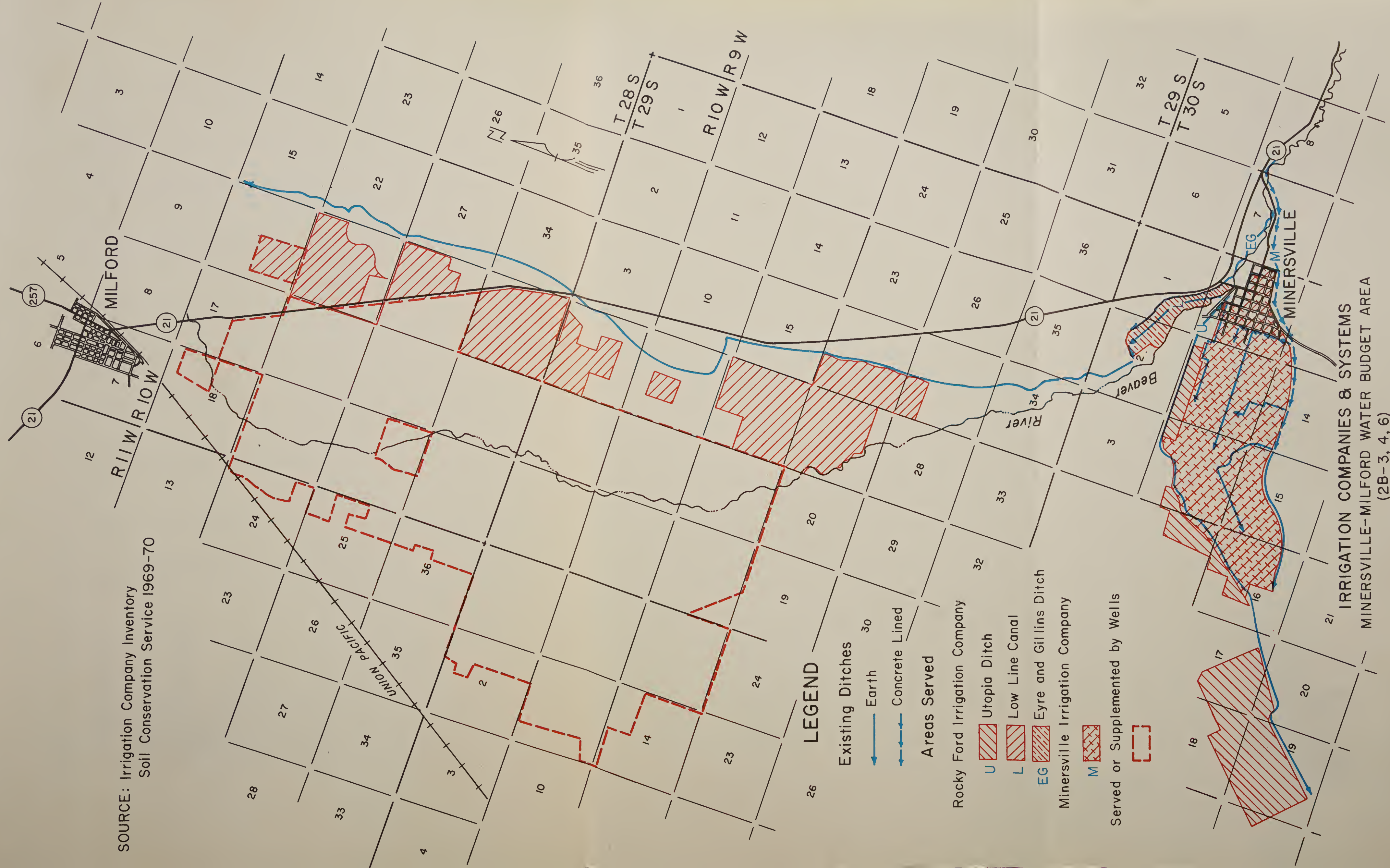
ROCKY FORD IRRIGATION COMPANY

This company serves approximately 3,050 acres under the Low Line Canal, Eyre-Gillins Ditch, and other small ditches in the area north and west of Minersville, and 950 acres under the Utopia Ditch south and west of Minersville. The company is incorporated with 46 shareholders and has storage rights in Minersville reservoir. Water is diverted from the Beaver River just east of Minersville and the median monthly diversion supply is estimated to be 3.13 acre-feet per acre, which is available 50 percent of the time. The system includes about 17 miles of canal and laterals with less than 2 miles lined. Conveyance efficiency is estimated to be 73 percent.

The water supply is subject to wide fluctuation from year to year and is seldom adequate to meet crop demands. Problems are complicated further by high seepage and operational losses in some areas and interruptions of water delivery because of floods.

There is an opportunity to line about 7 miles of this system together with appurtenant structures by 1980. There is also a potential opportunity to reorganize the system and convert to gravity sprinkler irrigation.

SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70



LEGEND

Existing Ditches

Earth

30

Concrete Lined

Areas Served

Rocky Ford Irrigation Company

U Utopia Ditch

L Low Line Canal

EG Eyre and Gillins Ditch

Minersville Irrigation Company

M

Served or Supplemented by Wells

[]

IRRIGATION COMPANIES & SYSTEMS
MINERSVILLE-MILFORD WATER BUDGET AREA
(2B-3, 4, 6)

BEAVER RIVER BASIN
UTAH-NEVADA

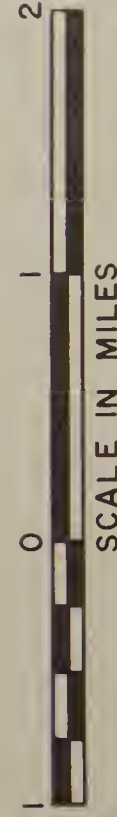


TABLE 5.--Irrigation company distribution and conveyance system summary, Beaver-Milford Subbasin, Beaver River Basin

Irrigation company and water budget area	Area served Acre	Existing condition (1965)					Improvement opportunity by 1980				
		Canal length Miles	Conveyance		Canal Lining		Conveyance efficiency Percent	Open		Canal Lining	
			Percent	Miles	Miles	Miles		Miles	Miles	Miles	Total Miles
Aberdare Bench Canal	800	7.1	60	0	0	0	77	4.5	1.0	5.5	
Furnace	300	3.3	80	1.7	0	1.7	88	1.0	0	1.0	
Mammoth Canal	1,400	11.5	60	0	0	0	86	10.0	0	10.0	
North Creek	2,700	20.0	70	0	0	0	89	10.0	1.0	11.0	
Second South Bench (Owens)	500	5.0	60	0	0	0	77	2.0	1.5	3.5	
Second Northeast Bench (Harris)	670	11.5	60	0	0	0	77	7.0	0	7.0	
West Side	1,300	25.0	70	1.9	0	1.9	80	6.0	0	6.0	
Willis Canal	500	6.0	60	0	0	0	70	1.5	0	1.5	
Lindsey Ditch	110	2.0	70	0	0	0	90	1.0	1.0	2.0	
West Field Canal (Tanner)	600	15.0	60	0	0	0	68	2.0	0	2.0	
Second Northwest Canal	700	5.0	60	0	0	0	70	2.5	0	2.5	
Second South Field Ditch	400	2.0	65	0	0	0	78	1.0	0	1.0	
South Creek Water Users	700	5.0	60	0	0	0	85	3.0	1.5	4.5	
South Ditch	110	1.8	70	0	0	0	81	1.0	0	1.0	
County Road Drain	150	4.5	60	0	0	0	75	1.0	0	1.0	
Barton Ditch	400	2.6	60	0	0	0	78	1.5	0	1.5	
Patterson Ditch	640	12.0	60	0	0	0	70	3.0	0	3.0	
Beaver City Corporation	520	1.6	65	0	0	0	80	1.0	0	1.0	
2B-1 Beaver-Greenville	12,500	140.6	64	3.6	0	3.6	81	59.0	6.0	65.0	
Manderfield	1,500	7.0	65	3.0	0	3.0	80	2.0	0	2.0	
2B-2 Manderfield	1,500	7.0	65	3.0	0	3.0	80	2.0	0	2.0	
Rockyford	4,000	17.0	73	1.9	0	1.9	88	7.0	0	7.0	
Minersville	2,000	12.0	73	4.0	0	4.0	95	0	9.0	9.0	
2B-3, 4, 6 Minersville-Milford	6,000	29.0	73	5.9	0	5.9	90	7.0	9.0	16.0	
Pine Creek	400	8.0	66	0	0	0	86	1.0	3.0	4.0	
2B-5 Cove Fort	400	8.0	66	0	0	0	86	1.0	3.0	4.0	
2B Beaver-Milford subbasin	20,400	184.9	67	12.6	0	12.6	84	69.0	18.0	87.0	

^a Length includes all company canals and laterals

CEDAR WATER BUDGET AREA (2B1-1c,2,4)

In the Cedar area, 8 irrigation companies serve about 12,500 acres ranging from under 500 acres to over 8,000 acres for various companies. Water supply is mainly from Coal Creek but one company diverts water from Shurtz Creek and several have supplemental well diversions. There are no irrigation storage reservoirs in this area. However, a large multi-purpose storage reservoir is being investigated in connection with the Coal Creek PL-566 watershed project which would serve most of the companies in this area. There are overlapping and closely paralleling systems in some areas. Canals and laterals for various irrigation companies range from 3 miles to 36 miles with a total of about 82 miles for the area including approximately 27 miles that are lined. The overall conveyance efficiency is estimated at 66 percent and canals in several systems are in "poor" condition with losses greater than 6 percent per mile. An additional 30 miles of canals and laterals could be lined in the next 10 to 15 years. This would increase conveyance efficiencies to about 84 percent and improve canals overall in this area to a "fair" condition. The development of multi-purpose reservoir will probably be beyond the next 10-15 years. Table 6 lists additional information on existing conditions and opportunities. Area served and existing canal systems are shown on the map following page 30.

SOUTH AND WEST FIELDS IRRIGATION COMPANY

This is a non-profit corporation with an estimated 150 stockholders serving about 550 acres in the southwest part of Cedar City. Water is diverted from Coal Creek just east of Cedar City and delivered through approximately 7.3 miles of canals and laterals at an estimated conveyance efficiency of 65 percent. About 3 miles of the system are lined.

Reoccurring floods on Coal Creek cause considerable silting of ditches. Litter picked up through the city is also a problem. The diversion structure is difficult to maintain and operate and a better structure is needed. Seepage losses are high in some sections of the canals. Fluctuations in water supply and lack of late season water are problems.

There is an opportunity within the next 10 to 15 years to line about 3 miles of canals and laterals and install a new desilting structure. The potential multi-purpose storage reservoir site on Coal Creek being investigated in connection with the PL-566 watershed project would also serve this company.

UNION FIELD IRRIGATION COMPANY

This corporation has 27 stockholders and 1,010 shares and serves about 1,000 acres north of Cedar City. Water is diverted from Coal Creek north of town at an average maximum flow of about 27 cfs. This water is supplemented by a well that serves the East Union pump area. The system includes about 9.5 miles of ditch of which about 75 percent is lined. Conveyance efficiency is estimated to be 75 percent.

Floods on Coal Creek cause silting problems at the diversion and in the canals. Some of the existing lining is broken and needs repair. There is a shortage of late season water.

Repair of existing lining and installation of about 1.5 miles of new lining are possible solutions by 1980. The potential multi-purpose storage reservoir site on Coal Creek would serve this company. Other solutions include reorganization and consolidation with East Extension, North Field, and Bulldog Irrigation Companies and possible conversion to a sprinkler system.

EAST EXTENSION IRRIGATION COMPANY

This company is a non-profit corporation with 30 stockholders and 800 shares. It serves an area north of Cedar City of about 750 acres. Some of the area is also served by other irrigation companies. Water is diverted from Coal Creek and delivered through about 8.6 miles of canals and laterals at an estimated conveyance efficiency of 70 percent. About 5.8 miles of this system is lined and about a mile of the system is used jointly with the North Field Irrigation Company. Water rights allow approximately 28 cfs to be diverted in this system, half of which belongs to the North Field Irrigation Company. One equalizing reservoir is also in use.

Silt and gravel are main problems, and also there is generally a shortage of water during the summer.

There is an opportunity to complete the lining of the system by 1980. Consolidation with Union Field, North Field, and Bulldog Irrigation Companies, and conversion to a sprinkler system are also possible solutions, along with the multi-purpose storage reservoir on Coal Creek.

NORTH FIELDS IRRIGATION COMPANY

This company serves about 670 acres located immediately north of Cedar City. There are about 850 shares in the corporation with varying values. This system and the area served is closely related to the East Extension Irrigation Company. These two companies share about one mile of canal and a diversion structure. About 28 cfs can be

diverted to this system from Coal Creek, half of which goes to the East Extension Irrigation Company. The North Fields system has about 8 miles of canals and laterals, 6 miles of which is lined, and an estimated conveyance efficiency of 75 percent.

Silt and gravel during high flows in Coal Creek along with a shortage of water during summer are major problems. Also there has been much cracking of existing lining which needs to be repaired to prevent further breakup.

There is an opportunity to complete the lining of the system by 1980. Other possibilities include consolidation with Union Field, East Extension, and Bulldog Irrigation Companies and conversion to sprinkler system, and the multi-purpose storage reservoir on Coal Creek.

BULLDOG IRRIGATION COMPANY

The Bulldog Irrigation Company serves about 500 acres northwest of Cedar City. Some of the area is also served by other ditches. The company is incorporated with 9 stockholders and 727 shares. Water is diverted from Coal Creek and delivered through about 3.3 miles of canals with an estimated conveyance efficiency of 70 percent. About one mile of the system is lined. The system includes an equalizing pond. Water rights are for high water only with a maximum average diversion of about 14 cfs. Most cropland has supplemental well water.

A late season water shortage and sedimentation of ditches are major problems. A new structure to control water from the equalizing pond is needed.

Potential opportunities by 1980 include one mile of canal lining and appurtenant structures. A new equalizing reservoir is also an alternative solution. Other possibilities include consolidation with adjacent irrigation companies and conversion to sprinkler systems.

COAL CREEK IRRIGATION COMPANY

Coal Creek Irrigation Company serves over 8,000 acres in the flood plain north and west of Cedar City. Water is diverted from Coal Creek but most of this area is supplemented with water from individual wells. The system contains an estimated 36 miles of canals and laterals including the Meadow, Jones-Wood, Jensen, Haslam, Ashdown, Foster, and Woodbury ditches. Only about 6 percent of the ditches are lined and the conveyance efficiency is estimated at 60 percent.

Water rights are for high water only, and late season supplies are inadequate. Sand and gravel deposition is a major problem along with frequent flooding, not only on Coal Creek but throughout the system.

Potential opportunities by 1980 include lining about 14 miles of the system. Other potential solutions include the multi-purpose reservoir on Coal Creek above Cedar City and flood control works in the flood plain of Coal Creek. These potential opportunities are being studied as part of the Coal Creek PL-566 watershed project.

OLD FORT, OLD FIELDS IRRIGATION COMPANY

This company is incorporated and serves about 520 acres immediately northwest of Cedar City. The maximum diverted flow from Coal Creek averages about 12 cfs and water rights are for high flow only. The system includes a new desilting structure and about 5.4 miles of canals with no lining. The estimated conveyance efficiency is 60 percent.

Sediment deposition in the system, flooding, and inadequate late season water are major problems.

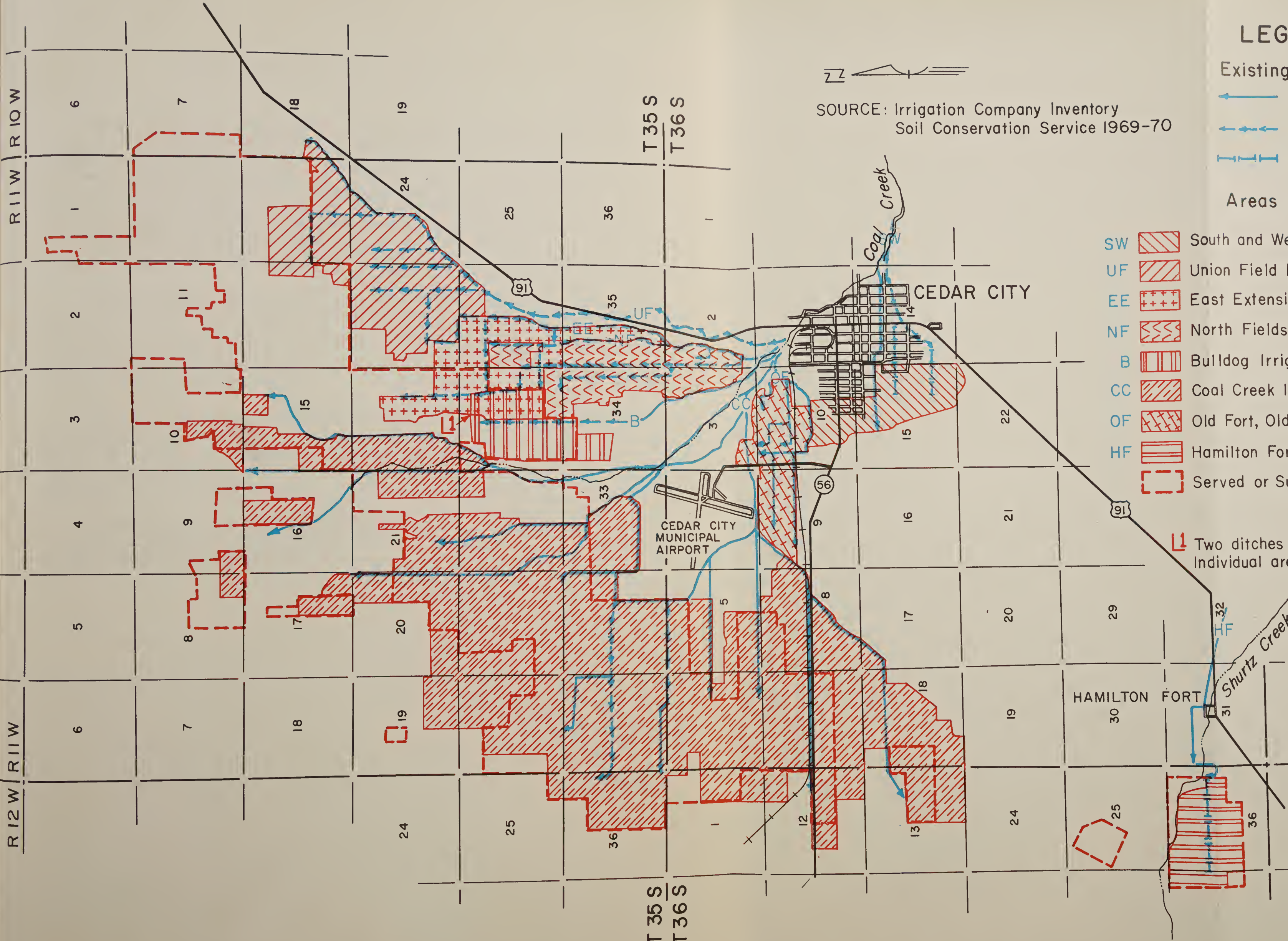
There is an opportunity within the next 10 to 15 years to line about two-thirds of the system. The multi-purpose storage reservoir on Coal Creek in Cedar Canyon would also serve this company.

HAMILTON FORT IRRIGATION COMPANY

This company has 4 members and serves about 480 acres at Old Hamilton Fort southwest of Cedar City. Water is diverted from Shurtz Creek and the flow averages about 4 cfs for 45 to 60 days. The area is supplemented by well water. The system contains a concrete diversion structure and about 3 miles of ditch, of which about one mile is lined.

Some flooding occurs in the creek channel but does not generally get into the irrigation system. Late season water from Shurtz Creek is inadequate.

The remainder of the system could be lined. There is also a potential opportunity to reorganize and convert to a sprinkler system.



SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70

LEGEND

Existing Ditches

- Earth
- Concrete Lined
- Pipeline

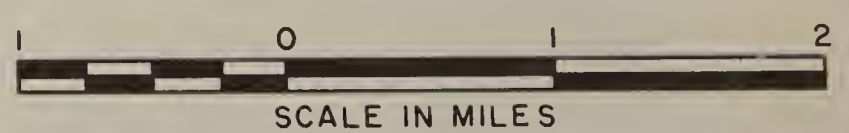
Areas Served

- SW South and West Fields Irrigation Company
- UF Union Field Irrigation Company
- EE East Extension Irrigation Company
- NF North Fields Irrigation Company
- B Bulldog Irrigation Company
- CC Coal Creek Irrigation Company
- OF Old Fort, Old Fields Irrigation Company
- HF Hamilton Fort Irrigation Company
- Served or Supplemented by wells

Two ditches deliver water to this land.
Individual areas are not delineated.

IRRIGATION COMPANIES & SYSTEMS CEDAR WATER BUDGET AREA

(2B1-lc, 2, 4)
BEAVER RIVER BASIN
UTAH-NEVADA



SUMMIT WATER BUDGET AREA (2B1-1a,3a)

Summit Irrigation Company is the only one in this water budget area. It is incorporated with 30 stockholders and 168 shares. The company serves about 1,000 acres immediately northwest of the town of Summit. About 20 cfs of water is diverted from Summit Creek just above town and distributed through about 4 miles of canals and laterals, half of which are lined. The system includes a diversion that is in good condition, and a small, 10 acre-foot equalizing reservoir. The canals and laterals are in "fair" condition with an estimated conveyance efficiency of 74 percent.

Unlined ditches have extensive plant growth with high water loss. Some of the existing lining is cracked and needs to be repaired. Flooding is a problem to the town and the irrigation system, and flood control measures are needed at the mouth of the canyon above town. Water storage is needed to provide adequate late season water and control fluctuations in supply.

Potential solutions within the next 10 to 15 years include lining the remainder of the system and repair of existing lining where it is broken. There is also a potential site for a small storage and regulating reservoir on Summit Creek but development would be beyond the next 10 to 15 year period.

Information on existing conditons and improvement opportunities is given in Table 6. Area served and existing canal systems are shown on the map following page 33.

PAROWAN WATER BUDGET AREA (2B1-1b,3b,3c)

Three irrigation companies (Little Creek, Paragonah, and Parowan) serve about 5,200 acres in this area. Each receive their water from a different stream, and minor areas receive supplemental water from wells. There is some irrigation water storage available to the Paragonah and the Parowan Irrigation Companies. Systems include 31 miles of canals and laterals with about 13 miles lined. The conveyance efficiency is estimated at 65 percent and losses greater than 6 percent per mile in many laterals. An additional 13 miles of canals could be lined within the next 10 to 15 years. This would improve the overall condition to "fair" and the conveyance efficiency to about 88 percent. Additional information on existing conditions and opportunities is given in Table 6. Areas served and existing ditches are shown on the map following page 33.

PAROWAN RESERVOIR COMPANY

This is an incorporated irrigation company with 50 stockholders and 2,500 shares serving about 3,100 acres immediately north and west of Parowan. The system includes 9 laterals and a main delivery canal which total approximately 20 miles in length, including the pipeline in Parowan Canyon. Only two of these laterals are lined and the conveyance efficiency for the system is estimated at 60 percent. Water is diverted from Parowan Creek and delivered through a pipeline to the hydroelectric power plant in Parowan where the tailwater is picked up and distributed by the company. Also, the company has storage rights in Yankee Meadows Reservoir.

Unlined laterals have considerable weed and willow growth and high seepage losses. Flooding is a constant hazard to the city, irrigation system, and fields, and flood control is needed.

Potential development opportunities by 1980 include lining of an additional 10 miles of the system with necessary structures. An alternative includes reorganization and conversion to a sprinkler system.

PARAGONAH CANAL AND RESERVOIR COMPANY

This company was incorporated in 1870 and serves about 1,300 acres immediately west of Paragonah. A maximum flow of 9.5 cfs is diverted from Red Creek below the Red Creek Reservoir which is located about seven miles east of Paragonah. The water is delivered through about 3 miles of pipeline to a hydroelectric power plant located at the mouth of Red Creek about a mile east of Paragonah. The irrigation company then diverts the tailwater into a small equalizing reservoir where it is distributed by pipeline and open ditch.

Red Creek Reservoir is owned and operated by the Irrigation Company. Water is delivered from the reservoir to the irrigation system from about June 1 to September 1. Any water in excess of the power company pipeline capacity flows down Red Creek to the irrigation system. The irrigation company is not obligated to furnish a given flow of water to the power company. Water, therefore, may be diverted from the reservoir as needed. In addition to water releases from the reservoir, there is a flow of about 4 to 5 cfs from Cold and Warm Springs located just above the power plant pipeline inlet. Warm Springs produces an almost constant flow throughout the year while Cold Springs varies depending on the season. There are over 8 miles of canals in the system, most of which is lined including the pipeline in Red Creek Canyon. The conveyance efficiency is estimated at 80 percent.

There is generally a shortage of late season water. Some flooding and silting occur, but recent improvements in the system has reduced damage considerably. Water losses in the unimproved sections of the system are fairly high.

Potential development within the next 10 to 15 years includes lining the remainder of the irrigation system and converting to sprinkler irrigation.

LITTLE CREEK FIELD IRRIGATION COMPANY

This company serves about 800 acres near the mouth of Little Creek northeast of Paragonah. Water is diverted at the mouth of Little Creek into several laterals. There are about 3 miles in the system with no lining, and conveyance efficiency is estimated at 60 percent. Some of the area is supplemented by well water.

Flooding and silting are problems and water from Little Creek is usually inadequate after the first of July.

Potential solutions within the next 10 to 15 years include lining about half of the laterals, and a small storage and regulating reservoir on Little Creek about 4 miles above its mouth. There is also a potential opportunity for reorganization and conversion to a sprinkler system.

LEGEND

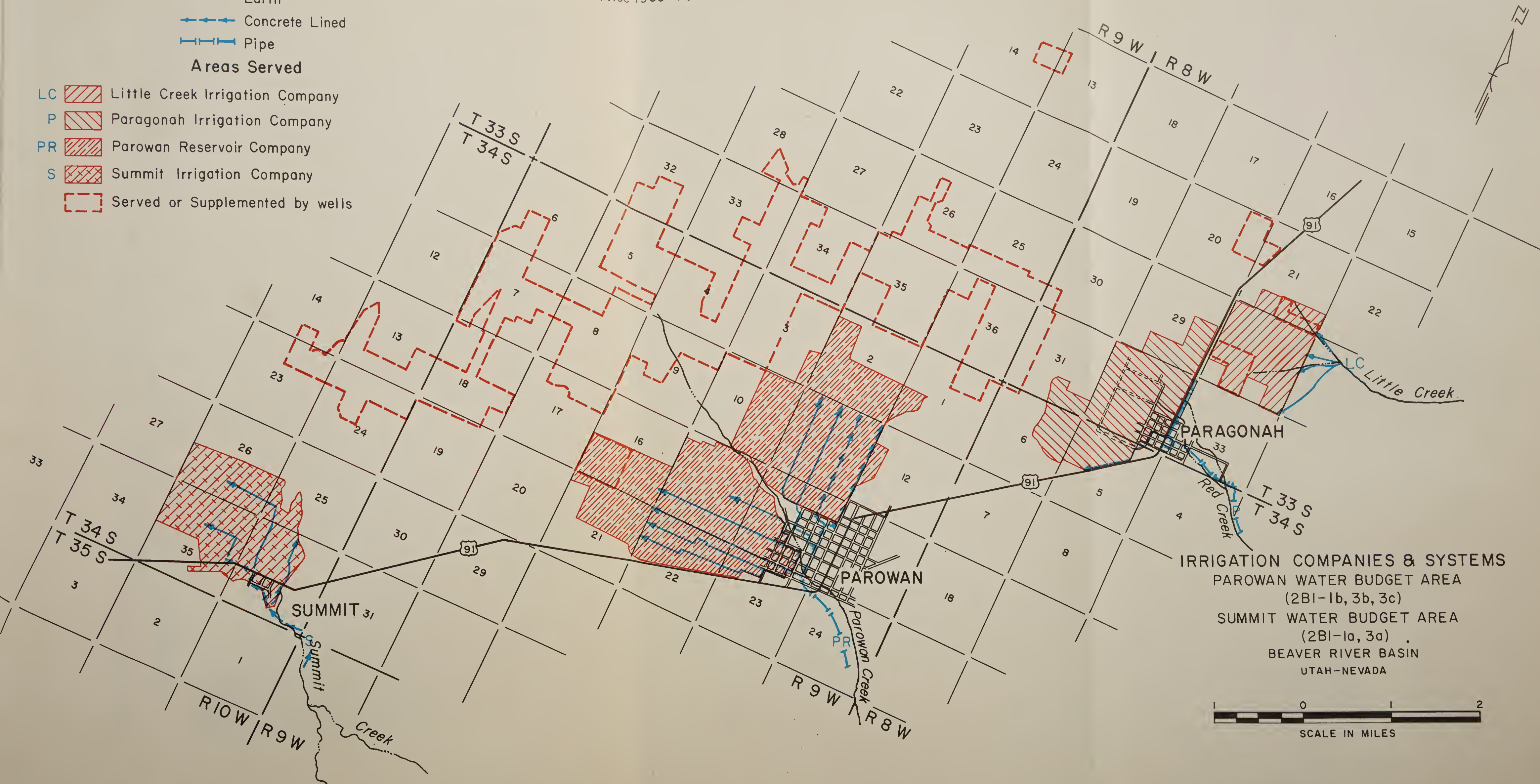
Existing Ditches

- ← Earth
- ← Concrete Lined
- ← Pipe

Areas Served

- LC Little Creek Irrigation Company
- P Paragonah Irrigation Company
- PR Parowan Reservoir Company
- S Summit Irrigation Company
- Served or Supplemented by wells

SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70



IRRIGATION COMPANIES & SYSTEMS
PAROWAN WATER BUDGET AREA
(2B1-1b, 3b, 3c)
SUMMIT WATER BUDGET AREA
(2B1-1a, 3a)
BEAVER RIVER BASIN
UTAH-NEVADA

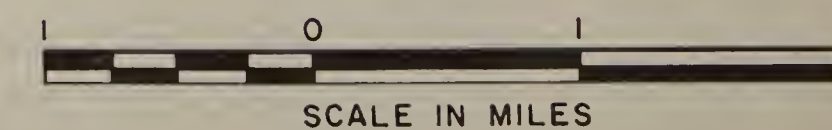


TABLE 6.--Irrigation company distribution and conveyance system summary, Cedar-Parowan subbasin, Beaver River Basin

Irrigation company and water budget area	Area served Acre	Existing condition (1965)				Improvement opportunity by 1980			
		Canal ^a length Miles	Conveyance		Canal Lining	Conveyance efficiency Percent	Canal Lining ^b		Total Miles
			Open	Pipe			Open	Pipe	
		Miles	Percent	Miles	Miles		Miles	Miles	Miles
Bulldog	500	3.3	70	1.2	0	85	0	1.0	1.0
East Extension	750	8.6	70	5.8	0	92	2.8	0	2.8
North Field	670	8.0	75	6.0	0	90	1.5	0	1.5
Union Field	1,000	9.5	75	7.7	0	88	1.5	0	1.5
South and West Fields	550	7.3	65	7.3	0.7	87	0	3.0	3.0
Old Fort Old Field	520	5.4	60	0	0	82	3.6	0	3.6
Coal Creek	8,030	36.9	60	2.4	0	80	14.6	0	14.6
Hamilton Fort Field	480	3.0	66	0	0.9	95	0	2.0	2.0
2B1-1c,2,4 Cedar	12,500	82.0	66	25.4	1.6	84	24.0	6.0	30.0
Summit	1,000	4.0	74	2.0	0	95	2.0	0	2.0
2B1-1a,3a Summit	1,000	4.0	74	2.0	0	95	2.0	0	2.0
Parowan Reservoir	3,100	20.0	60	3.6	2.6	85	10.0	0	10.0
Paragonah Canal and Reservoir	1,300	8.2	80	0	6.8	93	0	1.4	1.4
Little Creek Field	800	2.8	70	0	0	89	0	1.6	1.6
2B1-1b,3b,3c Parowan	5,200	31.0	65	3.6	9.4	88	10.0	0	10.0
2B1 Cedar-Parowan subbasin	18,700	117.0	66	31.0	11.0	87	36.0	9.0	45.0

^a Length includes all company canals and laterals

^b In addition to existing lining in 1965

NEWCASTLE WATER BUDGET AREA (2B2-1)

There are about 3,300 acres served by irrigation companies in this water budget area. Water is diverted from Pinto and Little Pinto Creeks, and one small group receives water from Meadow Creek. Small areas are supplemented by wells. Newcastle Reservoir provides storage water for Newcastle Reservoir Company water users. There are about 5 miles of lined canals and laterals in the 11 miles of systems. Conveyance efficiencies vary from 40 to 90 percent. There are opportunities to line another 5 miles of ditches by 1980 and improve conveyance efficiencies in the area to 90 percent. Additional information concerning conditions and opportunities is given in Table 7. Areas served and existing ditches for the Newcastle Reservoir and Pinto Irrigation Companies are shown on the map following page 36. Area served and existing ditches for the Meadow Creek users are shown on the map following page 37.

NEWCASTLE RESERVOIR COMPANY

This company is incorporated with 25 stockholders and 5,875 shares. It serves about 3,000 acres immediately north and west of the town of Newcastle. The system includes about 2.5 miles of canals, all of which are lined. Conveyance efficiency is estimated at 90 percent. Water is stored in Newcastle Reservoir on Pinto Creek and released on demand to the water users. A small area is supplemented by individual wells.

Water is often inadequate in late season. Water losses are high on some laterals not owned by the company. There is considerable sediment deposition in the reservoir and control measures are needed above the reservoir.

Early improvements were not identified. Potential developments include reorganizing the company delivery system to include more group laterals and lining them, enlarging Newcastle Reservoir, and installing flood and erosion control measures above the reservoir.

PINTO IRRIGATION COMPANY

Pinto Irrigation Company diverts water from Pinto Creek and serves about 200 acres at Pinto. This company is incorporated with 11 stockholders and 168 shares. The system includes a west and east ditch that total about 3.5 miles in length. The ditches are fairly clear of growth. The company utilizes one concrete diversion and one rock and brush diversion. Conveyance efficiency is estimated at 40 percent.

Losses in the system are fairly high particularly in the late season. Flooding is a problem at times and late season water supplies are generally inadequate.

Potential solutions by 1980 include lining the ditches and installing a new diversion structure.

MEADOW CREEK USERS

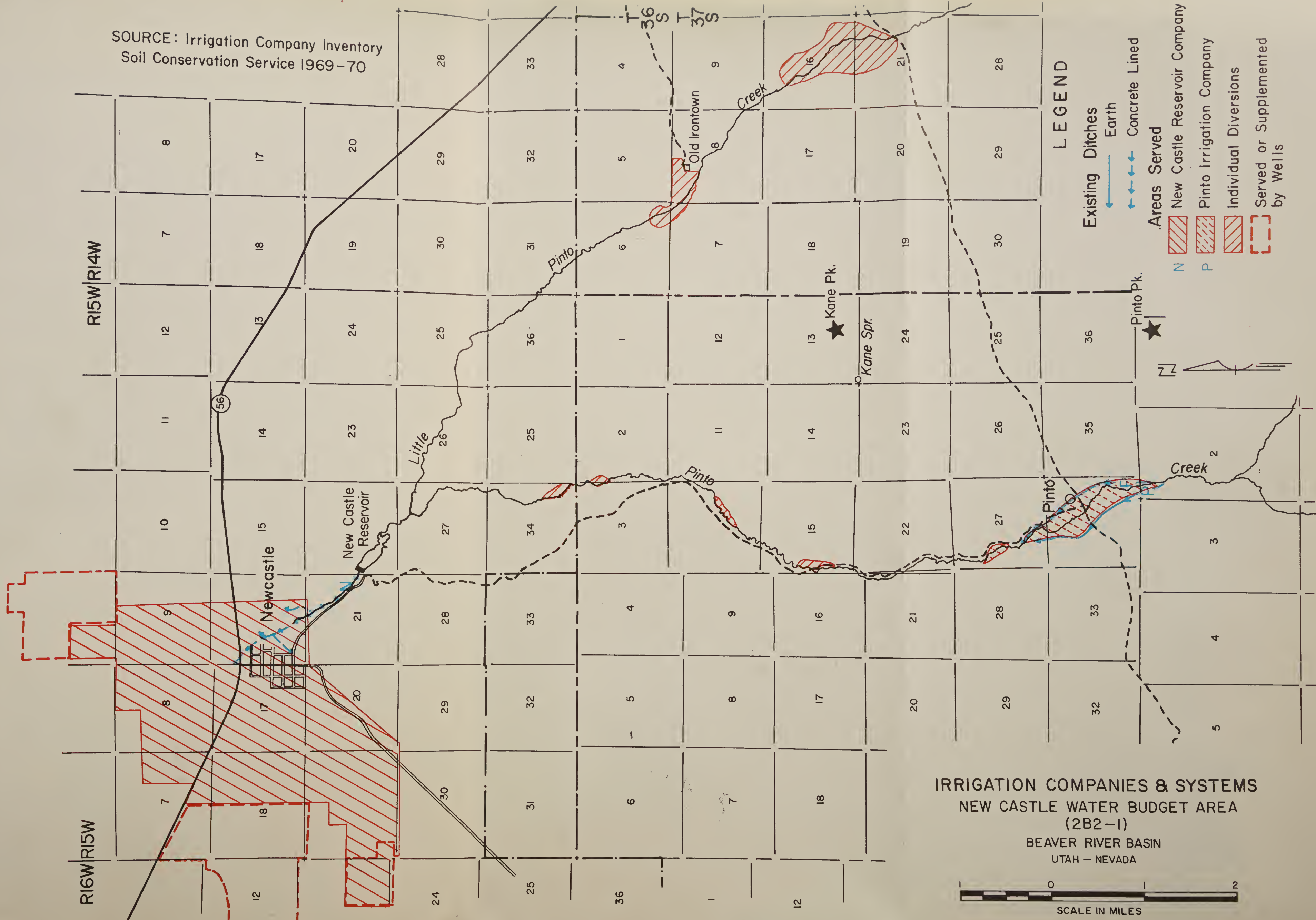
Water users on Meadow Creek include two brothers that divert the entire flow from Meadow Creek and irrigate about 100 acres near the mouth of the canyon. There is a diversion structure and about 5 miles of ditches in the system, and about half of the ditches are lined. Conveyance efficiency is estimated at 40 percent.

There is considerable weed growth in Meadow Creek above the diversion. There is heavy growth along the ditches and considerable seepage loss. Shortage of water, especially in the summer, is a serious problem. Frequent flooding occurs on the creek and threatens the delivery system.

Potential development by 1980 includes adding about 2 miles of pipeline to the existing system and installing a small storage and regulating reservoir near the mouth of the canyon. An alternative includes reorganization and conversion to a sprinkler system.



SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70



IRRIGATION COMPANIES & SYSTEMS
NEW CASTLE WATER BUDGET AREA
(2B2-1)
BEAVER RIVER BASIN
UTAH - NEVADA

LEGEND

Existing Ditches
Earth
Concrete Lined

Areas Served

- New Castle Reservoir Company
- Pinto Irrigation Company
- Individual Diversions
- Served or Supplemented by Wells

ENTERPRISE WATER BUDGET AREA (2B2-2)

Enterprise Reservoir and Canal Company is the only irrigation company in this water budget area. It is incorporated with 54 stockholders and 20,000 shares, and serves about 2,500 acres immediately northeast of Enterprise. Water is stored in Upper and Lower Enterprise Reservoirs on Little Pine Creek and is available on a demand basis to the users. The system includes about 16 miles of canals with over half of them lined. The conveyance efficiency is estimated to be 70 percent and the ditches are in "fair" condition. Some of the area is supplemented with water from individually owned wells.

Water losses are fairly high in the unlined ditches and some of the lined ditches need to be repaired. There is usually a water shortage in the late season. Flooding is a problem along parts of the ditch in Little Pine Creek. Sediment deposition in the storage reservoirs is probably high.

Potential solutions by 1980 include lining about 4 miles of canal, repairing or replacing broken lining, and installing a small multi-purpose reservoir at the Indian Rock Site on Shoal Creek about 5 miles west of Enterprise. There is also a potential opportunity for small debris basins on tributaries to the Enterprise Reservoirs.

Table 7 gives additional information on existing conditions and development opportunities. The area served and existing canals are shown on the map following page 37.

SOURCE: Irrigation Company Inventory
Soil Conservation Service 1969-70



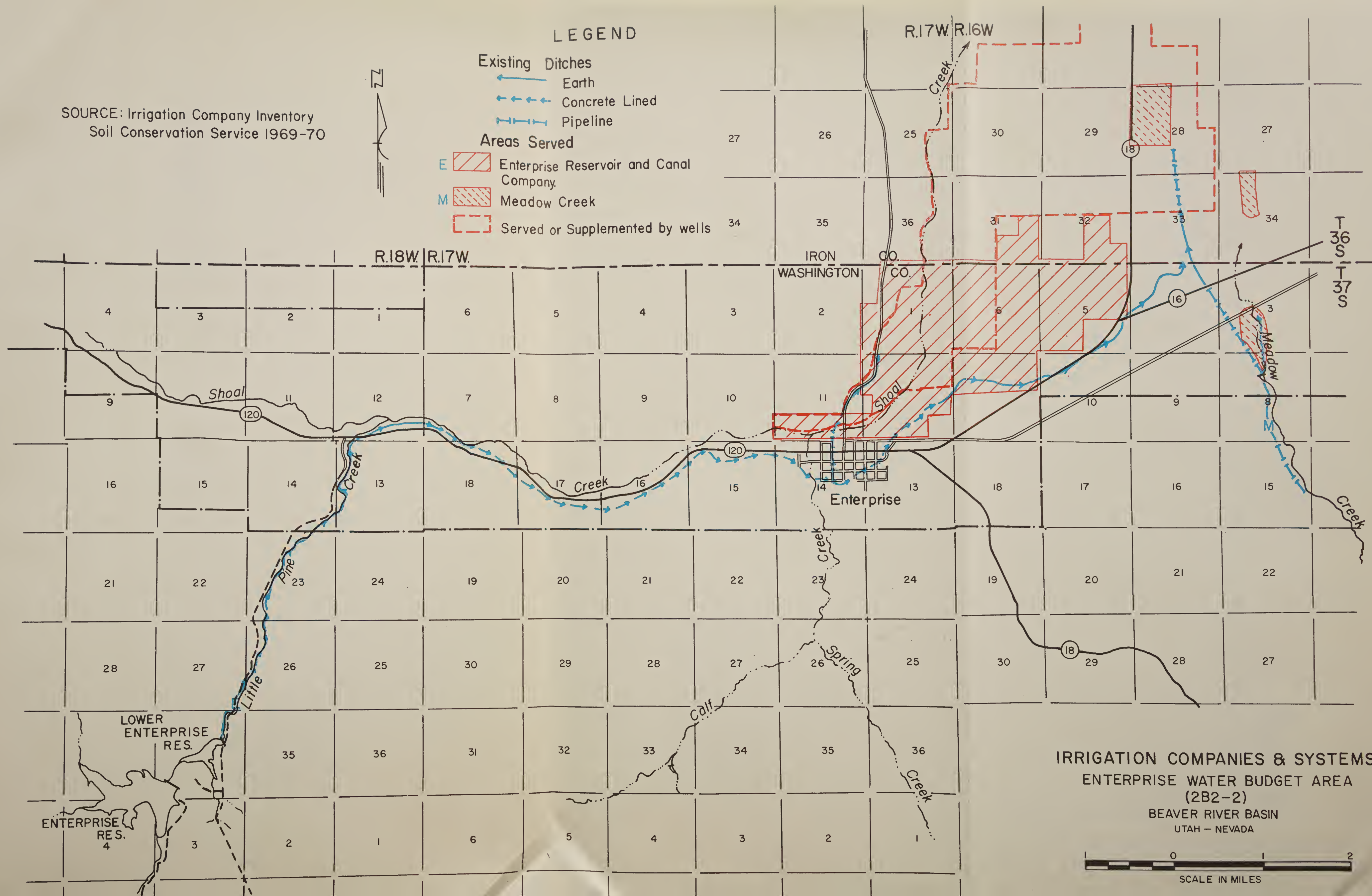
LEGEND

Existing Ditches

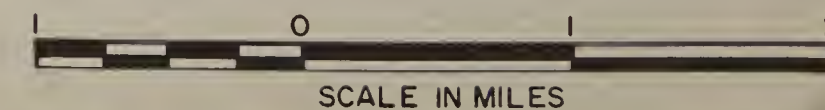
- Earth
- Concrete Lined
- Pipeline

Areas Served

- E Enterprise Reservoir and Canal Company.
- M Meadow Creek
- Served or Supplemented by wells



IRRIGATION COMPANIES & SYSTEMS
ENTERPRISE WATER BUDGET AREA
(2B2-2)
BEAVER RIVER BASIN
UTAH - NEVADA



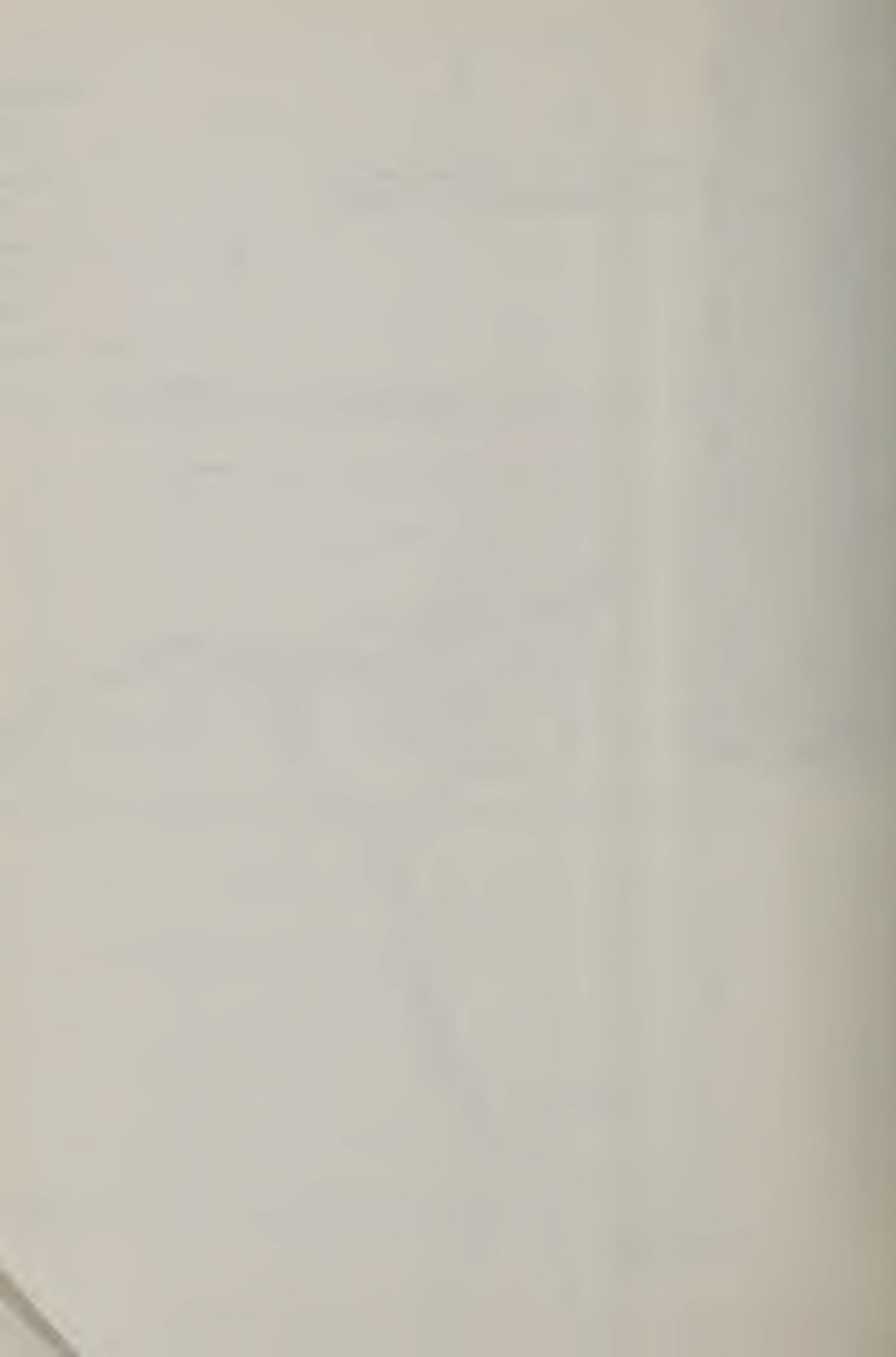


TABLE 7.--Irrigation company distribution and conveyance system summary, Escalante Desert subbasin, Beaver River Basin

Irrigation company and water budget area	Area served Acre	Existing condition (1965)					Improvement opportunity by 1980				
		Canal length Miles	Conveyance efficiency Percent	Canal Lining		Total Miles	Conveyance efficiency Percent	Open		Pipe Miles	Total Miles
				Open Miles	Pipe Miles			Miles	Miles		
Meadow Creek	100	5.0	40	0.5	2.0	2.5	90	0	0	2.0	2.0
Newcastle Reservoir	3,000	2.5	90	2.5	0	2.5	90	0	0	0	0
Pinto	200	3.5	40	0	0	0	90	3.0	0	0	3.0
2B2-1 Newcastle	3,300	11.0	80	3.0	2.0	5.0	90	3.0	3.0	2.0	5.0
Enterprise Reservoir & Canal	2,500	16.0	70	8.0	1.0	9.0	85	4.0	0	0	4.0
2B2-2 Enterprise	2,500	16.0	70	8.0	1.0	9.0	85	4.0	0	0	4.0
2B2 Escalante Desert subbasin	5,800	27.0	76	11.0	3.0	14.0	89	7.0	2.0	0	9.0

a Length includes all company canals and laterals

